

# PACKAGE OF PRACTICES FOR LIVESTOCK & POULTRY PRODUCTION AND HEALTH



Directorate of Publications  
Chaudhary Charan Singh  
Haryana Agricultural University  
Hisar-125 004







*Agemf*  
*28/11/98*

# **Package of Practices for Livestock & Poultry Production and Health**



**Directorate of Publications  
CCS Haryana Agricultural University  
Hisar-125 004**



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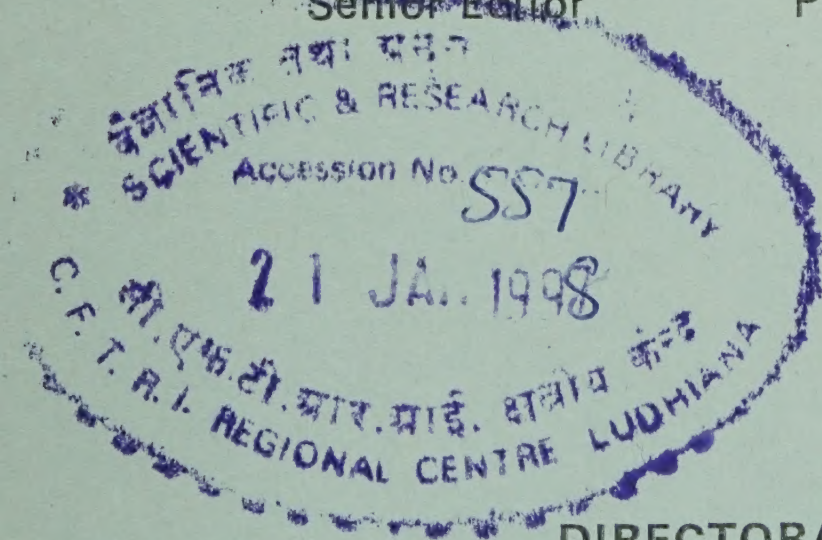
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**HISAR-125 004**

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Published by Prof. N. R. Godara, Director of Publications and  
Printed by S. S. Tonk, Press Manager at CCS HAU Press, Hisar.



## FOREWORD

Subsequent to Animal Husbandry Officers' Workshop held on April 20-21, 1993 and earlier, the Department of Animal Husbandry has started several programmes and projects of livestock and poultry production and health. Also, many new veterinary hospitals have been opened. As a result of the implementation of the various livestock and poultry developmental programmes, newer problems are confronted by the livestock owners and field functionaries.

Animal Husbandry Officers' Workshop provides a forum for vital linkage between research and extension workers. It is through such workshops that feedback of field problems to the concerned scientists and providing solution thereof is rendered possible. A Package of Practices on various aspects of livestock production and health like management, feeding, breeding, disease control, etc. of various species has been a felt-need over the years. In order to achieve these objectives and also to acquaint with the fast developing researches, there is imperative necessity of holding the workshops.

The then Vice-Chancellor, the then Director, Animal Husbandry, Haryana and Deans of the Colleges of Veterinary and Animal Sciences made arduous efforts in organising this workshop. It is because of the continuous efforts of the Directorate of Extension Education, in holding this Animal Husbandry Officers' Workshop could be materialised. Its usefulness and success depends on the desirable interaction between scientists and field veterinarians. The strenuous efforts of Drs. Narinder Singh, S.E.S. (A.Sc.), V. P. Sharma, Professor and Head (Animal Nutrition) former S.E.S. (Poultry), S.K. Khar, Professor of Veterinary Gynaecology & Obstetrics, former S.E.S. (Vety.), S. K. Verma, Professor and Head, Deptt. of Veterinary Gynaecology & Obstetrics-cum-S.E.S. (Vety.) and G. Krishna, E.S. (Poultry), in compiling the Package of Practices of Livestock & Poultry Production and Health in the presentable form for finalising recommendations, and organising the workshop are highly appreciated. It may be pertinent to mention here that

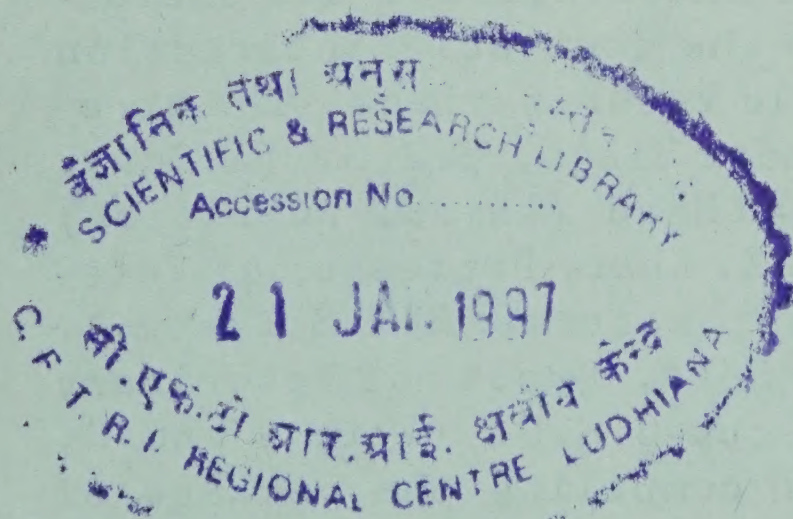


compiling the aforesaid manuscript for the first time ever since the establishment of CCSHAU has been possible due to significant contribution of the above scientists.

The material provided for the Package of Practices by the HODs of the two colleges is thankfully acknowledged.

The presentations and discussions, in various technical sessions which were held in 1993, gave ample opportunity to the field officers and scientists for interaction and evolving strategies for the development of livestock and poultry in the state. The scientists got sufficient feedback on field problems for conducting scientific investigations befitting the location specific problems. The Animal Husbandry Officers, in turn got an opportunity for professional enrichment and updating themselves, in important areas of their job requirement. Such mutual gain is a must both for the scientists and field officers, which can be made possible only through Animal Husbandry Officers' Workshop based interaction.

Appreciable efforts made by Dr. D. P. Thakur, Director of Extension Education, Dr. N. R. Godara, Director of Publications and the staff associated with bringing out this publication are highly commendable.



A handwritten signature in black ink, appearing to be 'S. Arya'.

( S. ARYA )  
Vice-Chancellor  
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## DAIRY CATTLE

Creation lies at the base of the world's entire civilization.....to breed good dairy cattle is to create and when done in full recognition of economic requirements is profitable. Animals of superior heredity were sought by the earliest breeders. And they will be sought by future generations.

—Karl B. Husser

### BREEDING AND SELECTION OF ANIMALS AND HERD RECORDING

The milk yield of the indigenous breeds varies between 1000 to 1800 kg per lactation. The average age at first calving and calving interval is much higher compared to exotic breeds. The genetic improvement of local breed through selection is a slow process. Of late crossbreeding has been accepted as a quick approach for dairy cattle improvement.

The native and exotic breeds involved in crossbreeding and their performance is summarised in the following Table :

Breed	Native place	Body size	Average milk yield	Remarks
1	2	3	4	5
<b>A. Native</b>				
1. Haryana	Rohtak, Hisar, Karnal and Gurgaon Distt.	Medium size	1000 kg with 4% fat.	Bullocks are very powerful for draft.
2. Sahiwal	Montgomery (Pakistan)	Medium heavy size	1800 kg with 5.5% fat	Bullocks are lethargic and slow at work.
3. Red Sindhi	Sindh (Pakistan)	Medium size	1800 kg with 5.5% fat	Well adapted to varying conditions of soil and climate.



1	2	3	4	5
4. Tharpar-kar	Sindh (Pakistan), Kutch (Gujarat), Jodhpur & Jaiselmer (Raj.)	Medium and compact	1400 kg	Dual purpose for milk and draft.
<b>B. Exotic</b>				
1. Holstein Friesian	Holland, many other countries	Heavy	5500-6500 kg 3.5-4% fat	Good breed for crossbreeding
2. Jersey	Jersey Island	Small	3000-4000 kg 5% fat	High fat %age
3. Browns-wiss	Switzerland	Medium size	4500-5000 kg 3.9-4.2% fat	Well adapted to adverse climate
4. Red Dane	Denmark	Medium to heavy	4500-5000 kg 4.0% fat	Dual purpose for milk and meat.

### Crossbreeding

Crossbreeding as breeding policy will result in development of newer strain of milch cattle. Choice of the exotic breed and levels of exotic inheritance may be fixed depending upon the suitability of the environment and resource availability. After creation of crossbred population, inter-breeding of mosaic crossbred cow population with pedigreed and progeny tested sires of outstanding merit should be taken up in order to stabilize the level of exotic inheritance at an optimum level for best performance under tropics with prevailing environmental and managerial conditions.

### Choice of Exotic Breed and Level of Exotic Inheritance

As regards the use of exotic breeds on indigenous non-descript cattle population in order to produce the half-breds, Holstein Friesian semen should be used for enhancing milk production and producing economically viable dairy cattle under optimum resource availability, environment and managerial conditions. Jersey may be used in poor



resource availability and managerial conditions and in case with more preference for higher fat production. For further breeding of half-bred cow population, mating with three-fourth exotic inheritance (75%) pedigreed and/or progeny tested bulls of outstanding merit should be taken up. Three-fourth Holstein Friesian bulls should only be used for breeding crossbred population to stabilize the level of exotic inheritance to 5/8th level (62.5%), as Holstein is now the cynosure of dairying. Under the conditions of higher resource availability, best management and environment, e. g. progressive farming areas of Ambala and Karnal districts, mating of half-bred cows with Holstein Friesian semen for producing three-fourth breds is also recommended. Subsequently the mating of 5/8th and 3/4th crossbred cows should be taken up with 1/2, 5/8th or 3/4th Holstein Friesian proven bulls in such a way that exotic inheritance oscillates around 5/8th level.

### **Selection of Crossbred Bulls**

Stabilizing the exotic inheritance around 5/8th level requires the availability of proven sires of 1/2, 5/8th and 3/4th inheritance of Holstein Friesian. The initial selection of such young bulls should be done on pedigree basis and finally proven through progeny testing both at bull mother farms and field level. Unless the males come from the Elite herd with their genetic merit properly evaluated under the prevailing field conditions, the progress achieved by crossbreeding in initial stages is likely to be lost in production and stabilization of exotic inheritance around 5/8th level.

### **Selection of Female Breeding Stock and Culling of Inferior Cows**

The ultimate goal of a breeder is to produce an economically viable cow having :

- (i) a faster rate of growth (above 350 kg weight at first calving).
- (ii) lower age at first calving (below 40 months).
- (iii) higher milk production potential (above 2500 kg in 300 days),
- (iv) fewer dry days (60 to 100) and optimum calving interval (below 400 days).
- (v) In a herd 65-75 per cent cows remaining in milk at any time of the year.

On these basis the important reasons of culling of cows would be poor growth, reproductive inefficiency, low production and disease. Cows



with highest expected producing ability should be selected as breeding stock, while those with lowest probable producing ability should be culled.

### **Conservation of Indigenous Breeds**

The goals of breeding cattle for economic dairying led to the introduction of crossbreeding, certainly producing its effect in a very short span. Coverage under crossbreeding of cows of pure indigenous breeds, if continued to be taken up at the same pace, is expected to endanger the very existence of cattle breeds like Haryana, Sahiwal, Tharparkar and Red Sindhi. Though none of these breeds except Haryana has its origin in this state, but loosing the existence of these breeds is uncalled for. Emphasis, therefore, must be laid on pure breeding of the cows (which are true to the breed) with progeny tested bulls (of the same breed) of proven merit. These proven bulls should be supplied for use on the farmer's herd. In order to achieve these, it is most essential to maintain, conserve and evaluate the germplasm of these breeds at governmental, institutional, private or bull mother farms. For effective selective breeding, progeny testing of bulls (with major emphasis on Haryana breed of cattle) need to be carried out at large scale both at farms as well as field level.

### **Herd Recording**

Maintenance of various breeding and pedigree records provide an effective base for the improvement programmes and progeny testing of bulls. This also provides information for effective follow up action for ensuring proper growth, reproduction and health status and production efficiency. Various records on income and expense incurred provide an effective base for economic dairy farming. The maintenance of records on the farmer's herd forms an essential component of the field progeny testing programmes. The utmost emphasis should, therefore, be given on recording of information (proformas given in Annexure-I) on pedigree, milk production, dates of important events, income, expense and mobility of the animals from farmer's herd. Studies conducted on systems of field recording have revealed that obtaining milk recording only six times over a lactation of 300 days even at irregular intervals (once in 50 days sampling) is sufficient for field progeny testing. However, for finding lactation production of a cow, irregular recording at monthly interval should be taken up. Recording once-a-day milking was also found almost equally efficient, if alternated between morning and evening on each sample-day with 12 hours milking interval.



## GENERAL MANAGEMENT AND HOUSING

### Care and Management

#### Care and Management of Pregnant Cows

Dry off the cows 60 days before calving by withholding concentrate and reducing green fodder supply for 5-7 days and stop milking abruptly. About two-third of the total growth occurs in the last three months of pregnancy. The pregnant animals should be fed well during this period for proper development of the foetus and for the maintenance of mother in good health. Two weeks before expected date of calving remove the cow to a properly disinfected calving lines. Provide comfort bedding for pregnant cow. Pregnant animal should not be allowed to move for a long distance. Check over crowding and slipping. Prevent injury to the udder as it distands near calving. About three days earlier to calving, give it light and laxative ration by increasing proportion of bran and adding gur (Jaggery).

#### Care during calving

Process of calving should occur within one hour after the rupture of water bag. If there is delay or other complication, help of the expert should be sought. It is better to tie the animal till the expulsion of placenta which is likely to occur within 6-8 hours after calving. It should be disposed off and pen should be properly cleaned. If the placenta is not expelled within 24 hours or so, seek the help of the veterinary doctor. Some animals especially crossbreds get oedematous swelling on udder or other parts of the body which is just a normal phenomena and usually disappear within one week after calving. However, if the swelling is hard, warm and painful it should be got treated. Wash the udder with lukewarm water containing a mild solution of potassium permanganate. Every efforts should be made to milk the cow within two hours. Avoid complete milking during the first 2-3 days in high yielding animals after calving.

#### Care of calf

Immediately after birth clean and dry the calf with a clean dry cloth, put light ligatures on the naval cord at a distance of 1 cm from the naval. Disinfect it with tincture of iodine and cut the naval cord below the ligature. The naval cord should be painted with tincture iodine 2-3 times in a day till the naval cord dries up. If the calf feels any difficulty in normal breathing then help the calf by artificial breath-



ing by applying gentle pressure and jerk on the chest wall and alternatively extending and flexing the fore limbs. Feed the colostrum @ 1/10th of body weight of the calf. The colostrum from the mother should be fed two to three times a day for the first 3-4 days. In case mother dies immediately after birth then in the place of colostrum the calf should be given 5 ml of castor oil (for one day), 5 ml of fish liver oil and one egg twice daily for the first four days along with milk from other cow. Within two hours of first suckling, calf generally passes muconium (first faeces). If this does not occur, anema with a tea spoonful of sodium bicarbonate in one litre of the luke warm water may be given.

## **Weaning**

It is desirable to allow suckling of colostrum. Subsequently, if desired wean it immediately. Weaning helps in recording the actual milk yield of the animal, regulates the milk feeding according to calf requirement, avoids injury to teats, checks the transmission of infectious diseases, and solves the problem of mother instinct in case the calf dies. To the weaned calves, feed fresh milk at body temperature about 39-40°C, according to standard schedule upto three months.

## **Dehorning**

Horns in animals are potential threat to the keeper, to the fellow animals and prone to horn cancer. Their presence on the animal also requires more feeding space in a common manger. Calves should be dehorned between 5 to 15 days of age. Avoid dehorning on cloudy or humid days. An electric dehorning is the best or otherwise hot iron dehorning may be used. This is done by burning the horn core/bud or the points on the poll region from where horn grows.

## **Identification**

Proper identification of the animal is necessary if the number of animals in the herd is large. In young calves tatooing in ears or tags in chains around the neck can be used for the identification of calves. In heifers or adult cow neck tags or branding can be followed. Hot iron branding is the best identification method.

## **Care of Milking Animals**

Animals should be shifted on normal concentrate mixture after five days of calving. Concentrate allowance should be increased gradually



depending upon the increase in milk yield and the quality and quantity of green fodders available. Generally, the concentrate mixture is fed one kg for every 2.5 kg of additional milk (above 5 kg) produced by cows, or 400 gm per kg milk produced by cow.

Milking should be done in calm and clean area and milking pale, if possible, in a separate milking barn. Pre-milking routines such as washing of cows, feeding concentrate, bringing in the poles should be done at regular intervals. Before milking, the udder and teats should be washed with mild potassium permanganate solution. Milking should be done with full hand in 6-8 minutes completely, followed by stripping if so required. Milkers should be healthy, free from any contagious disease and wear clean clothes, observe regular milking hours. Cows having injury or inflammation of udder or teats, no letting down producing red, clotted or gruelly milk should be isolated for proper treatment by veterinarian. Suckling is the best natural let-down mechanism, but when washing is practised gentle massage of udder and teats for about one minute will stimulate let down. Dry off the cows 60 days before the expected date of calving.

### **Hoof Trimming**

Means cutting of over grown hooves. Hoof troubles make cows difficult to walk for feed and water and result in a drop in milk production. Cows in confinement tend to grow long toes and build up excessive tissue on the soles of the feet. If these conditions are not corrected by proper hoof trimming, permanent damage may result in the form of crooked legs and weak pasterns. It will reduce the incidence of foot-rot, lameness and other foot troubles.

### **Management of Bullocks**

Animals should be liberally fed with growth ration. Animal should attain more than 300 kg body weight at 30-36 months of age. Castration should be carried out at about 9 months of age. Nose-string (Nath) should be applied at one year of age for controlling the animal. Animal should be put to work at the age of two years. Young bullocks should be trained gradually with the help of a docile experienced bullock. Avoid excessive feeding before and immediately after work. Shoe the bullocks properly before using them for work on hard ground and for threshing grain, as otherwise there is a danger of their feet getting injured.



## Management of Bulls

After calthood, young bulls should be given liberal amount of good quality fodders and concentrate mixture according to its nutrient requirements and use of bull in breeding season. Bull should be provided with less bulky fodders.

Put the nose-ring by punching the nasal septum when the bull is about one year of age. Bulls should be kept individually after  $1\frac{1}{2}$  years of age. Bulls should be given exercise to attain sexual activity and to improve the semen quality. Bulls can be used for natural service or for semen collection after two years of age.

## HOUSING

### Cattle Housing

Semi loose housing-system is most suitable according to prevailing conditions in our state. In this system animals are tied at the time of feeding, milking and treatment and for rest of the time they are kept loose. This system is recommended because it overcomes the disadvantages of both tying (conventional) and keeping loose all the time. Lengthwise direction of animals house should be East-West with feeding manger towards north. The floor space requirements for different categories are given in Table 1 and feeding/watering space requirements in Table 2.

TABLE 1

Floor space requirements for different categories of cattle  
(Per animal)

Type of animal	Floor space requirement (m <sup>2</sup> )		Maximum no. of animals per pen	Height of shed (cm) at eaves
	Covered area	Open paddock		
Cattle and Buffaloes				
Bulls	12.0	120.0	1	175 in medium heavy rainfall areas and 220 semi-arid and arid areas.
Cows	3.5	7.0	50	
Buffaloes	4.0	8.0	50	
Down-calvers	12.0	12.0	1	
Young calves	1.0	2.0	30	
Older calves	2.0	4.0	30	



TABLE 2

Feeding, watering/space requirements for different categories of cattle  
(Per animal)

Type of animal	Space per animal (cm)	Total manger length per 100 animals (cm)	Water trough length per 100 animals (cm)	Width of manger water trough (cm)	Depth of manger water trough (cm)	Height of inner water manger water trough (cm)
1. Adult cattle and buffaloes	60-75	6000-7500	600-750	60	40	50
2. Calves	40-50	4000-5000	400-500	40	15	20

### Manger

For adults the manger should be 50 cm wide, 40 cm deep, the height of forewall and hindwall should be 75 cm and 130 cm, respectively. The inner side of manger should be rounded and plastered with cement. For young calves the manger should be 50 cm wide, 30 cm deep and the height of the forewall should be 45 cm.

### Drainage

It should be 30-40 cm wide, 5-7 cm deep and its ends be rounded, give a slope of 2.5 cm for every 12 m for efficient drainage.

### Disinfection of the Sheds

Disinfection of sheds is necessary to eliminate all micro-organisms that cause diseases. Procedure to be used for disinfection, however, will depend upon the type of shed and nature of organisms. For disinfecting the dairy sheds, all the equipments and fittings that are removable should be sprayed with phenol solution (4%) and then taken out. Infected dung and bedding if any should be cleaned properly. Lower parts of the walls and floor should be cleaned with hot solution of four per cent detergent or sprayed with 4 per cent phenol solution. The walls and the floors should be washed with water 6 hours after disinfection. In case of Kutcha flooring, it is advisable to



scrap the surfaces upto one or two inches deep and soil should be buried.

### **Summer Management**

In summer, provide adequate amount of fresh cool and clean drinking water. Plant shady trees around the sheds and give water bath 3-4 times a day. Install fans and desert coolers for high yielding animals. Give good quality of leguminous and non-leguminous fodders to the animals. Sprinkling of water in the shed also reduces the heat stress. Increase protein content in animal ration by 5%.

### **Winter Management**

In winter and during rains, keep animals under cover especially at night. It may be desirable to provide individual bedding daily to young calves. Give extra feed having more energy during extreme cold. Maintain sanitary conditions in and around the cattle shed. To prevent chilly winds at night, the sides of sheds should be closed by providing curtains of gunny bags or polythene sheets.

### **Feeding Management**

Proper feeding of dairy animals for their optimum and economic production is the key to a successful dairy enterprise whether it is on a small or large dairy unit. It has been noticed that our farmers either over-feed their animals leading to uneconomical production or give low nutrients due to scarcity of fodder and due to lack of knowledge. In both the situations he is at loss. To make them aware about the balanced and economic feeding a scientific feeding has been simplified to suit their various situations. The following guidelines provided for various categories of dairy animals can serve a good basis to initiate a scientific feeding.

### **Nutrient Requirements**

The daily nutrient requirements of various categories of dairy animals for optimum growth, maintenance and milk production are given in Tables 3, 4 and 5, respectively.



TABLE 3

Daily nutrient requirements of growing animals (Growth rate about 550 g/day)

Live weight (kg)	DM (kg)	DCP (kg)	TDN (kg)	Ca (g)	P (g)
70	2.10	259	1.39	8	5
80	2.33	282	1.52	9	6
100	2.78	328	1.80	12	9
120	3.23	373	2.07	15	11
140	3.67	419	2.34	17	12
150	3.90	442	2.47	20	13
160	4.12	465	2.61	20	13
180	4.57	510	2.88	20	13
200	5.02	556	3.14	20	15
220	5.47	601	3.41	22	15
240	5.97	647	3.68	25	17

TABLE 4

Daily nutrient requirements for maintenance of cattle

Live wt. (kg)	DM (kg)	DCP (g)	TDN (kg)	Ca (g)	P (g)
250	4-5	140	2.20	25	17
300	5-6	168	2.65	25	17
350	6-7	195	3.10	28	17
400	7-8	223	3.55	28	20
450	8-9	250	4.00	31	23
500	9-10	278	4.45	31	23
550	10-11	310	4.90	31	23
600	11-12	336	5.35	31	23



TABLE 5

Nutrient requirements per kg milk production

Feed (%)	DCP (g)	TDN (g)	
3.0	48	275	
3.5	51	300	
4.0	55	325	
4.5	58	350	Note : 2.8 g Ca and 2.0 g P should be provided per kg of milk produced.
5.0	62	375	
5.5	65	400	
6.0	68	425	
6.5	72	450	
7.0	75	475	
7.5	79	500	

### Calf Feeding

Allow the calf to suckle colostrum from its mother for first 3-4 days (approx. 1/10th of body weight) about 2.5 to 3 litres per day. After weaning on 4th day onwards the feeding of milk is based on body weight. On an average, 3.00 litres per day milk is fed during first two weeks. Thereafter, the feeding schedule of whole milk, calf starter and succulent fodder given in Table 6 is followed. The ingredients composition of calf starter is also given in Table 7.

TABLE 6

Daily feeding schedule for calves

Age of calf	Whole milk (litres)	Calf starter (kg)	Succulent fodder (kg)
1-4 days	3.0 (colostrum)	—	—
5-15 "	3.0	—	—
16-30 "	3.5	ad lib	ad lib
1-2 months	2.5	0.25	ad lib
2-3 "	2.0	0.50	ad lib
3-4 "	1.0	0.75	ad lib



**TABLE 7**  
**Composition of calf starter**

Feed ingredients	Parts per 100
Maize/wheat/barley/oats	50
Groundnut cake/soybean meal	50
Fish meal/skim milk powder	7
Wheat bran/rice bran	10
Mineral mixture	2
Common salt	1
Vit. mixture (A,B <sub>2</sub> ,D <sub>3</sub> & K)	50 g
TM 10	50 g

### Preparation of Concentrate Mixtures

Depending upon the availability of ingredients and requirement of the animal, generally two categories of mixture may be prepared. One having 16% CP and another containing 20% CP. These can be fed to the animals as indicated with the ration composition of different categories of animals. About 30-60 g of mineral mixture and about 20-40 g of common salt is fed daily depending upon the age and production of animal. These two ingredients can also be incorporated in the concentrate mixture as shown in Table 8.

**TABLE 8**  
**Composition of concentrate mixtures**

Ingredients	Conc. mix-I CP 16%	Conc. mix-II CP 20%
Maize/wheat shods/wheat	30	30
Barley/oats/bajra/jawar	15	10
Til cake/GNC/soybean cake/guar meal	11	18
Linseed/mustard/cotton seed cake (elecorticated)	11	13
Wheat bran/rice bran/deoiled rice bran	30	26
Mineral mixture	2	2
Common salt	1	1

Note : Conc. Mix-I is fed alongwith leguminous fodders and Conc. Mix-II is fed alongwith non-leguminous fodders.



## Feeding of Growing Dairy Heifers

Growing heifers are fed as per their body weight and growth rate. When leguminous fodders are available, a low CP concentrate (16%) and when non-legume fodders are available a high CP concentrate (20%) can serve the purpose. The daily rations for different age groups have been suggested in the Table 9.

TABLE 9  
Daily feeding schedule of growing herd

Category	Legume green fodder (kg)	Straw/stover (kg)	Conc. mix-I CP 16% (kg)	Non-legume green fodder (kg)	Conc. mix-II CP (20%) (kg)
4-6 months	7-8	0.5	1.5	6-7	1.5
6-12 "	15-20	1.0	1.0	12-15	1.5
12-18 "	20-25	1.5	1.0	20-25	1.0
18-30 "	30-35	2.0	1.0	30-35	1.0
Preg. heifers (3 months before calving)	35-40	3.0	2.0	35-40	2.0

## Feeding of Dry and Pregnant Cows

The average body weight of adult cow is around 400 kg and accordingly the rations have been advised. The scarcity period for greens has been considered for the formulations. This can serve as a guideline for maintenance and optimum growth of foetus for next lactation (Table 10).

TABLE 10  
Rations for dry and pregnant cows

Ingredients	When ample green fodder is available	When less green fodder is available	When scarcity of green fodder
<b>A. Dry Cows</b>			
Green fodder (kg)	30-35	10-12	2-3
Straw/stover (kg)	5-6	7-8	8-9
Conc. mixture (kg)	1.0	1.5	2.0
<b>B. Pregnant Cows</b> (3 months before calving)			
Green fodder (kg)	30-35	10-12	2-3
Straw/stover (kg)	5-6	7-8	8-9
Conc. mixture (kg)	1.5-2.0	2.0-2.5	3-4



## Feeding of Lactating Cows

Daily rations for the cows weighing 400 kg and producing 10 litres of milk/day have been suggested. The different conditions when green fodders (legume/non-legume) are available/neither in plenty/curified/conserved as hay or silage and when green fodder is not available at all, have been given due consideration. Four situations have been considered and accordingly feeding guide has been prepared (Table 11).

TABLE 11

### Rations for lactating animals

For cows producing 10 kg milk per day (Hay available)

#### 1. Rations when abundant green fodder available

(i) Legume green fodder	60-65 kg
Straw/stover	4-5 kg
Mineral mixture	30 g
(ii) Non-legume green fodder	40-45 g
Legume hay	5-7 kg
Mineral mixture	30 g

#### 2. When limited green fodder (Hay/silage available)

(i) Legume green fodder	25-30 kg
Conc. mixture-I	2.0 kg
Silage	20-25 kg
(ii) Non-legume green fodder	25-30 kg
Legume hay	5-7 kg
Conc. mixture-II	2.0 kg

#### 3. When limited green fodder (Hay/silage not available)

(i) Legume green fodder	25-30 kg
Straw/stover	7-8 kg
Conc. mixture-I	3.0 kg
(ii) Non-legume green fodder	20-30 kg
Straw/stover	4-5 kg
Conc. mixture-II	4.0 kg

#### 4. When no green fodder is available

(i) Straw/stover	8-10 kg
Conc. mixture-II	6-7 kg

Note : One kg Conc. mixture is equivalent to 8 kg green fodder.



## Feeding of Breeding Bulls and Working Bullocks

The guidelines for feeding of breeding bulls and working bullocks have been suggested to keep the bulls in active service and for bullocks proper allowances have been suggested as per their work load. Generally 3-4 hours of routine working is considered as normal, whereas 6-8 hours of ploughing or carting is considered as heavy work. The Table 12 shows the suggestions for feeding above categories in different situations of fodder availability.

TABLE 12  
Rations for breeding bulls and working bullocks

Category	Ration I (kg)			Ration II (kg)		Ration III (kg)	
	Legume green fodder	Straw/stover	Conc. Mix. I	Non-legume green fodder	Conc. Mix. II	Straw/Conc. stover	Conc. Mix. II
18-24 months	30-35	2.0	1.0	20-25	1.5	3-4	3.0
24-30 "	30-40	3.0	1.0	35-40	1.5	4-5	3.0
Bulls (in service)	35-40	3.0	2.5	35-40	3.0	4-5	5.0
Bulls (not in service)	35-40	3.0	1.5	35-40	2.0	4-5	4.0
Bullocks (normal works)	35-40	3.0	1.5	35-40	2.0	4-5	4.0
Bullocks (heavy works)	35-40	3.0	2.5	35-40	3.0	4-5	5.0

Note : Upto 18 months, same feeding schedule should be followed as mentioned for calves and growing heifers.

### Concentrate mixture for cattle and buffalo

1. Maize/Barley/Oat/Broken wheat/Jowar	30
G. N. Cake (deoiled)/Guar meal/Mustard Cake	
Sunflower cake (50 : 50)	30
Wheat bran/deoiled rice bran	27
Molasses/deoiled rice bran	10
Salt	01
Mineral mixture	02
2. Wheat bran/Rice bran	50
Mustard cake/Linseed cake/Guar meal, Cotton seed cake	30



Gram chuni	17
Salt	1
Mineral mixture	2
3. Til cake/Sunflower cake+ Guar meal (50 : 50)/Mustard cake	30
Gram Chuni/deoiled rice bran	20
Jowar/Barley/oat	25
Mango seed kernel (dried)	12
Rice bran/molasses	10
Salt	1
Mineral mixture	2

#### Note :

1. These concentrate mixtures contain TDN about 65% and CP about 18%.
2. When green is not available add vitamin A supplement @ 6 g/q.

#### Feeding of cattle and buffalo during scarcity period

The following complete feed can be prepared during drought or flood situation. To prepare one ton of feed (10 q) the ingredients can be mixed in the given proportion.

(a) Straw of wheat, paddy, bajra, jowar, etc.	9 q
(b) Urea	10 kg
(c) Molasses	100 kg
(d) Mineral mixture with salt	5 kg
(e) Vitamin supplement	50 g

#### Procedure

Dissolve urea thoroughly in 10-15 litre of water and then mix it thoroughly in molasses. The mineral and vitamin supplement should also be mixed with this solution at the same time. The straw should be chaffed and spread on pucca floor. The solution should be sprayed with sprayer or hose used in gardens. Constant stirring of solution and the straw is essential for thorough mixing. This mixture can be fed as such to all categories of animals except young calves in following quantity :

Adult (non-lactating)	8 to 10 kg
Lactating (2-3 kg milk)	Ad lib.
Heifers	6-8 kg
Bullocks and bulls	Ad lib.



## REPRODUCTION MANAGEMENT

### A. Age of Sexual Maturity and First Time Breeding

The age of sexual maturity is the stage of a heifer when the same acquires capability to bear an offspring. This is generally governed by the factors i. e. weight and age. Since there are breed differences in the components, the age at sexual maturity differs from one group of animals to another provided other parameters remain constant. Questions are asked as to whether a heifer should be bred or inseminated at the particular age/weight. It is strongly recommended that at least one heat must be left as the same is generally unregularly and the animal be bred at the next heat.

### B. Heat Detection and A. I.

Heat detection is one of the biggest problem in reproductive management. The farmers who maintain one or two cows face this difficulty as they cannot maintain a teaser. Such farmers should keep a close watch on these animals and for any of symptoms for the animal to be in heat.

- She may mount other cows or be mounted by other,
- She may twist her tail frequently and often raise it,
- the vulva may be slightly red and swollen,
- clear mucous secretion coming out of vulva,
- frequent urination and restlessness,
- milk production may decline,
- bellowing; and
- loss of appetite.

For a commercial dairy, the owner is advised to keep a separate teaser for heat detection. Time of heat detection is very critical particularly for the animals in which A. I. is to be done. Such cows must be got inseminated from trained technician/veterinarian after 12 hours of start of heat. As a thumb rule, cows observed in heat in the morning may be inseminated in the afternoon and vice-versa. If the animal does not come in the next heat after a gap of 21 days or so, it should be taken for expected pregnancy. In case the cow repeats it should be got reinseminated. But total A. I. in a sequence should



not exceed three or four. If the animal continues to repeat regularly after every 21 days, it should be got examined from a veterinarian.

### **C. Pregnancy Check**

It has been seen that 90% of the farmers do not care once the animal has been bred. Each animal must be got checked for pregnancy from a trained veterinarian after 2 months of insemination/breeding otherwise 20-25% of cows are likely to go unattended for heat detection as these are non-pregnant. Once the animal has been declared pregnant, special care for feeding must be ensured and expected date of calving should be noted.

### **D. Post Partem Care and Heat**

This is another parameter which many farmers do not attend to. As a result calving interval between the calving increases which in turn causes great economic loss to the owner. Some of the cows do come in heat within 30 days of calving while others do not exhibit estrus after 90 days. In both the cases, the owner should give a reproductive rest of 45 days to the animal after normal calving. It should be bred/inseminated, if the animal comes in heat within 45-90 days. In case the heat is delayed for more than 90 days, it should be got examined immediately from a veterinarian so that she is properly treated and brought into reproductive cyclicity and minimum inter-calving period is maintained.



# ANNEXURE I

## RECORDS

### 1. DAILY DIARY

I. Date :

II. Calvings :

Dam No.	Sire No.	Date of calving	Sex of calf	Wt. of calf	Remarks
1.					
2.					

III. Disposal or death :

Animal/Dam No.	Date of birth	Sex	Mode	Cost	Remarks
1.					
2.					

IV. Reproduction :

Insemination/Pregnancy Diagnosis/Follow up/Treatment

S. No.	Animal No.	Date of last calving	No. of services	Last date of service	Sire No.	Result	Remarks
1.							
2.							
3.							

V. Production :

No. of animals	Milk prod.	Milk sold	Income from sale	Day's wet average	Herd average	Remarks
Morning						
Evening						

VI. Details of sale of any other product/byproduct :



VII. Purchases :

Feed and fodders, medicines, ingredients, animal etc.

S. No.	Particulars	Quantity	Per unit rate	Total cost	Remarks
1.					
2.					
3.					

VIII. The routine management practices undertaken at the farm :

- (1) Tatooing/dehorning
- (2) Dipping/Deworming
- (3) Vaccination
- (4) Treatment
- (5) Others

2. BIRTH/CALVING REGISTER AND CALF DISPOSAL

S. No.	Date of birth	Dam No.	Sire No.	Sex of calf	Wt. of calf at birth	Disposal		Remarks
						Date	How	

3. REPRODUCTION PROFORMA

Brand No. .... Date of birth ..... History sheet No. ....  
 Dam No. .... Date of 1st heat. ....

Particulars	Ist calving	IIInd calving	IIIrd calving	IVth calving	Vth calving
I. Service (Date/Sire No.)					
1.					
2.					
3.					
4.					
5.					



## II. Conception

- (a) Date of preg. diagnosis
- (b) Result
- (c) Date of conception
- (d) Expected date of calving
- (e) Actual date of calving
- (f) Sex of calf

## III. Reproductive health

- 1. Disorder
- 2. Treatment
- 3. Follow-up

---

## 4. MILK RECORD REGISTER

S. No.	Order of calving	Cow No.	Date of calving	Weekly recording			Date dried	Days in milk	Total milk yield		
				(say) every Monday							
				1st	2nd	3rd	52nd				
				M	E	M	E	M	E		

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## 5. HERD HEALTH REGISTER

Date	Animal	History	Symptoms	Diagnosis	Treat- ment	Detail of vac- cination or hygiene	Cost of treat- ment
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## 6. MONTHLY EXPENSES AND INCOME REPORT

S. No.	Particulars	Quantity	Rate (per unit)	Total cost
1.	Concentrate feed (kg)			
2.	Green fodder (q)			
3.	Dry fodder (q)			
4.	Other feed ingredients			
5.	Labourers			
6.	Supervisors			
7.	A. I. service expenses			
8.	Treatment expenses			
9.	Misc.			

### Total expenses (Rs.)

1. Milk sold
2. Income from dung
3. Income from carcasses
4. Income from sale of animals
5. Income from sale of milk products
6. Other sources

### Total income (Rs.)

## 7. MONTHLY SUMMARY OF HERD STATUS

Prepared at the end of the month of.....

1. Addition and Disposal (No.)	<u>Calves</u>	<u>Heifers</u>	<u>Cows</u>	<u>Total</u>
(a) Birth/purchase				
(b) Death				
(c) Disposal/sold				



## 2. Reproduction status

Herd strength.....

(a) Total breeding population  
(Cows & heifers)

(b) No. of per cent cows/  
heifers pregnant

(c) No. & per cent cows non-pregnant

(i) Over 60 days.....(ii) Over 90 days.....

(iii) Over 120 days.....(iv) Over 150 days.....

(v) Over 180 days.....(vi) Over 200 days.....

(vii) Total.....

## 3. Production status :

(a) Total no. of cows in milk :

(b) Total milk produced :

(c) Per cent of the adult cows in milk :

(d) Milk production/cows.....kg

(e) No. of cows dried :

(f) No. of cows coming in fresh lactation :

(g) Peak yield.....kg

## 8. PERIODICAL WEIGHING REGISTER

S. No.	Tattoo No.	Brand No.	Date of birth	Wt. at weeks					Wt. at months					Wt. at	Remarks
				0	1	2	3	4	5	6	7	8	9	Ser-	Cal-
		(Dam's)	(animal)											vice	ving



## HAEMOPROTOZOAN DISEASES IN CATTLE

Tick-transmitted haemoprotozoan diseases viz., theileriosis, babesiosis and anaplasmosis are of great economic importance. Losses in terms of low production and high mortality due to these diseases greatly impede the cross-breeding programme aimed at improvement of livestock for enhancing milk production.

Pure-bred exotic as well as their cross-bred cattle and indigenous calves are highly susceptible to these diseases. Majority of cases of these diseases occur during summer and rainy months i. e. from April to October.

### Theileriosis

Majority of cases of theileriosis are recorded in very young calves below two months of age. Young calves of all breeds are equally susceptible to theileriosis. These calves pick up the infection and suffer from the acute form of clinical disease. These calves either die, if untreated, or react and recover to become premune carriers. Such recovered animals may suffer again in later life when they are exposed to any kind of stress such as malnutrition, inter-current infection, pregnancy, parturition, etc.

Animals suffering from theileriosis show enlargement of superficial lymph nodes, high fever (40 to 42°C), anaemia, weakness, recumbency in later cases and high rate of mortality. During the course of illness, these animals may continue feeding and ruminating despite high fever, anaemia and weakness till or so before death. Diagnosis can be established from symptoms, examination of biopsy from enlarged lymph nodes as well as blood smears. A new drug Buparvaquone (Butalex, M/s Coopers Animal Health Ltd., U. K.) @ 2.5 mg per kg b. wt., single I/m injection has been found to be highly effective (about 95 per cent) when given along with supportive therapy in the form of Vit. B-12, B-Complex and liver extract in field clinical cases. Highly anaemic cases may also be given blood transfusion.

For control of this disease, a cell culture vaccine against bovine tropical theileriosis has been developed in this laboratory and has been tested experimentally which will be shortly put to use in the field particularly for young calves as well as adult cattle.



## Babesiosis

Animals suffering from babesiosis show high fever, haemoglobinuria, anaemia and high mortality. The condition has to be differentiated from haematuria. The urine is collected in a glass bottle and is kept for some time. In haematuria RBC's tend to settle down and supernate becomes clear, whereas, in haemoglobinuria, the urine is uniformly coffee coloured. Or, the urine is centrifuged and the sediment is examined under microscope. In haematuria, RBC's can be seen, whereas in haemoglobinuria no RBC's are seen. Haemoglobinuria due to babesiosis should also be differentiated from haemoglobinuria due to phosphorus deficiency. In the latter condition, there is no fever and it is primarily seen in buffaloes during their later stage of pregnancy or soon after parturition. Moreover, animal responds to the administration of phosphorus or other related therapy.

## Anaplasmosis

Cases of anaplasmosis occur in adult cattle rather than in young calves. These cattle, under various kinds of stress, become susceptible. The symptoms of this vector-borne rickettsial disease are not highly specific but of bizarre nature. The animals develop fever which may go unnoticed as the sick animals continue eating and drinking. The parasite causes anaemia leading to weakness, unthriftiness, jaundice and decrease in milk production in cows and failure to work efficiently amongst bullocks. There is no haemoglobinuria in this disease. Buffaloes suffer rarely from this disease. Mortality is not very high as the disease assumes prolonged and insidious course. The continued ill health is responsible for tremendous economic losses. Diagnosis can be confirmed by examining the stained blood smears in which the dot like *Anaplasma marginale* organisms can be seen mostly on the margins of the infected red blood cells. However, the diagnosis is confirmed only by the experts as the organisms can be easily confused with several artefacts in the stained smears. The disease can be treated successfully by injecting tetracyclines (10-20 mg per kg body wt.) for 5 to 7 days. Haematinics are essential to check anaemia.

## Control of Haemoprotozoan Diseases

For control of these diseases, regular temperature of animals should be recorded during summer and rainy months. Animals



showing febrile reaction should be paid special attention. Blood smears of these animals should be examined for confirming the diagnosis and appropriate treatment should be undertaken. Regular spraying with acaricides like Malathion, Sumithion, etc. is advised to minimise tick population. Animals should be sprayed with 0.5 per cent solution and animal sheds with 1.0 per cent solution of Malathion/Sumithion at an interval of 15-20 days.

### Surra/Trypanosomiasis

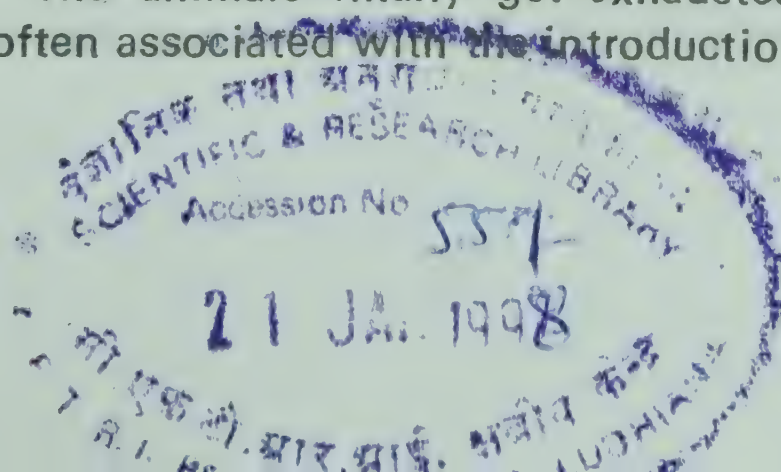
Surra is caused by *Trypanosoma evansi* in the domestic animals. The disease is transmitted mechanically by biting flies such as *Tabanus*, *Stomoxys*, *Haematopota* and *Lyperosia*. *Trypanosoma evansi* affects a wider range of hosts including horse, dog, camel, cattle, buffalo, elephant and pig, etc. The clinical disease varies according to strain of the parasite and species of the host. Cattle and buffaloes though acting as carriers also at times show fatal outbreaks.

Surra is almost fatal in horses if not treated. Death occurs in a few days to a few months depending on the virulence and strain of the organism. Emaciation and oedema are the most common clinical signs. The oedema vary from urticarial plaques on the neck and the flanks to oedema of the legs and lower parts of the body. An intermittent fever may be present. On post mortem, there is marked anaemia, emaciation, enlargement of lymph nodes and splenomegaly. Petechiae occur on the serous surface and in the parenchyma of liver and kidneys.

Camels are highly susceptible but the disease runs a chronic course, terminating fatally. Progressive weakness, emaciation, oedema of dependent parts and a course of about three years are common, hence known as 'Tibersa'.

A chronic and fatal type of disease is usual in the dogs. Death occurs in one to two months. Oedema and corneal opacity are common symptoms.

In cattle and buffaloes, the affected animals die all of a sudden (per-acute) or may show signs of nervous irritation e. g. circling, incoordination, apparent blindness, blind charging and bellowing, etc. The animals finally get exhausted and die (acute form). This is often associated with the introduction of the disease





or a new strain of the parasite. Additional stress of floods in rainy season, fly population, vaccination, hard work and starvation may act as predisposing factors.

## Diagnosis

- (a) Fresh wet blood film. This is applicable in acute cases and peripheral blood collected at the height of temperature should be examined. Motile organisms can be easily identified.
- (b) Stained blood smear examination. Thick and thin Giemsa stained smears should be examined. Thick smears are useful when the parasitaemia is low. This can be used both in acute and chronic cases.
- (c) Mercuric chloride test. This is used in camels only. Add one drop of serum to one ml of 1 : 30,000 mercuric chloride solution in distilled water. Mix gently. White opalescence appearing in a few seconds is a positive reaction.
- (d) Biological inoculation test. One to five ml of fresh blood collected in heparin should be injected immediately into mouse/rat/guinea pig/young pup by intraperitoneal route. Blood from these animals should be tested daily by fresh wet blood film method for a period of 7-14 days before declaring a sample negative.

## Treatment

- (a) Antrycide prosalt, a combination of quinapyramine methyl sulphate and chloride in the ratio of 3 : 2. It is used @ 6 mg per kg body weight subcutaneously. Although it is tried and effective medicine, but the drug is not easily available in the market and is perpetually in short supply.
- (b) Tribexin presalt, a combination of quinapyramine methyl sulphate and chloride in the ratio of 3 : 4. It is recommended to be used @ 6.66 mg per kg body weight subcutaneously. It has been found to be curative and prophylactic upto 81 days. It is easily available in the market.
- (c) Gilpol (G. Loucatos). It contains suramin and is recommended by manufacturers to be used @ 0.5 gm/45 kg body weight intravenously. However, the relapses may be observed.



It does not have appreciable chemoprophylactic effect. The drug is easily available in the market.

- (d) Suramin. An effective remedy is used @ 1 gm/100 kg body weight intravenously and is well tolerated by camels.
- (e) Berenil. A dose of 10 mg/kg body weight in the form of a single intramuscular injection is recommended in cattle and buffaloes. The sterilizing effect is observed @ 10-16 mg/kg body weight in experimentally infected buffalo calves. However, Berenil is contraindicated in camels as it causes severe reaction in them.

## MASTITIS IN DAIRY ANIMALS

Mastitis is a disease complex having different causes, different degrees of intensity and variations in duration and residual effects. The disease is mainly caused by bacterial infections in the udder and physical factors like cold and mechanical injuries have been reported to act as predisposing causes. In terms of economic losses, it is undoubtedly the most important disease confronting the dairy industry throughout the world. Apart from being of concern to dairy industry, it is also of public health importance. Diseases like staphylococcal food poisoning, streptococcal infections, brucellosis, tuberculosis and Q-fever may be transmitted to men if milk is consumed raw. The same is true of cryptococcus, nocardia and some other seldom encountered organisms that infect udders.

### Aetiology

A number of agents, such as, bacteria, rickettsia, yeasts, fungi and viruses have been reported in scientific literature as causing mastitis. However, mastitis of economic importance is caused by bacterial infections. The relative importance of several kinds of organisms involved could vary in different areas and countries. Studies carried out in the Department of Veterinary Medicine, H.A.U., Hisar revealed staphylococci and streptococci to be the main organisms associated with mastitis in this area of the state. Other organisms were less frequently encountered.

### Clinical Signs

Mastitis in dairy animals may occur in different forms.



## I. Clinical

(i) **Peracute** : This is sudden in onset with severe inflammatory reaction. The udder is enlarged, hot and tender. One or more quarters may be involved, but generally the infection is confined to one quarter. The secretion is often scanty and appears like blood serum. The animal shows loss of appetite, reduced milk yield, depression, weakness and raised body temperature. In severe toxæmic cases paraplegia may occur.

In gangrenous mastitis, the affected quarter is greatly swollen and there is little discoloured fluid in the gland. In a few hours, the teat becomes cold and the gland contents become watery and sanguineous. Later there is blue discolouration of the teat and of variable portion of the gland. In severe cases, signs of toxæmia and death may occur.

(ii) **Acute** : There is severe inflammatory reaction in the quarter/quarters without any marked systemic reaction. The secretion is apparently abnormal.

(iii) **Sub-acute** : There is mild inflammatory reaction but milk shows definite abnormality.

(iv) **Chronic** : It is often characterized by induration in the region of gland cistern. There are recurrent attacks of inflammation with little change in milk. Secretory disturbances are mainly indicated by a more or less salty taste and an increase in cell content and more frequently white coagulates are also seen. The quantity of milk may gradually decrease and at times secretion may cease altogether.

## II. Sub-clinical

Milk is visibly normal, but shows increased cell count and the presence of mastitis pathogen on cultural examination. This form of disease is by far the most common in dairy herds. Sub-clinical mastitis is usually over-looked and goes unnoticed by the dairymen. This is because of the fact that there are neither marked changes in the udder tissue nor any gross abnormality in the character of udder secretion. This form of mastitis is recognizable only by the application of mastitis screening tests and laboratory examination of milk. Sub-clinical mastitis is best treated on the last day of drying-off with long acting intramammary infusions.



### III. Latent

The existence of pathogen within the mammary gland without any evidence of mastitis.

#### Diagnosis

The diagnosis of clinical mastitis offers no difficulty because of apparent changes in the affected quarter/quarters and in the milk secretion. However, sub-clinical form presents difficulty, because of absence of visible changes. Therefore, several tests have been devised which can be used to diagnose mastitis and to detect the causative micro-organisms.

##### I. Screening tests

These are presumptive diagnostic procedures and can be readily conducted without extensive laboratory facilities. They aid in detecting changes caused by mastitis either in the udder or in the milk composition. Some of the tests are mentioned below. Of these, California mastitis test is the most widely used test.

- (i) Physical examination of the udder
- (ii) The strip cup test
- (iii) The california mastitis test (CMT)
- (iv) The catalase test
- (v) The modified whiteside test (MWT)
- (iv) Somatic cell count test

##### California mastitis test (CMT)

###### (i) Reagents

Sodium lauryl sulphate	3 g
Distilled water	100 ml
pH	8.0
Bromocresol purple	1:10,000

###### (ii) Procedure

Into a plastic paddle having few shallow cups add equal quantity (3 ml) of milk and the reagent. Mix the contents, try a gentle circular motion of the paddle in a horizontal plane and read the test as follows :



Symbol	Suggested meaning	Description of visible reaction
—	Negative	Mixture remains liquid with no evidence of formation of precipitate.
T	Trace	A slight slime which has tendency towards gel formation.
+	Weak	A distinct slime with no tendency towards gel formation.
++	Distinct positive	Mixture thickens immediately with gel formation. On continued swirling, mass moves around the periphery leaving the bottom of the cup exposed.
+++	Strong positive	A distinct gel forms which tends to adhere to the bottom of the paddle and during swirling a distinct central peak is formed.

## II. Specific laboratory tests

The specific laboratory tests are primarily bacteriological procedures designed to detect the causative organisms. They require considerably more time and facilities than the screening tests.

### Treatment

The treatment of mastitis is governed by the species of the infecting organisms, the stage and severity of infection and the proper selection and administration of the drug. Recent cases with little damage to the secretory epithelial cells can be expected to respond favourably than peracute or chronic cases with pronounced fibrosis. Specific bacterial types of mastitis require specific treatment but there are some general principles that apply to all forms of mastitis.

**Parenteral therapy :** In addition to local infusions, parenteral therapy is recommended in all cases of mastitis in which there is systemic involvement in order to control or prevent the develop-



ment of generalised infection and assist in the treatment of infection in the gland.

**Udder infusions :** In view of importance and efficiency, udder infusions are preferred method of treatment. A number of proprietary preparations are available for treating mastitis cases viz., Alcidlox, Pendistrin and Pendistrin-SH, Floclox-L, Broacil, Nefuran and Mastalone. They should be used as per manufacturers directions.

It is needless to say that strict hygiene is necessary during treatment to avoid introduction of harmful environment organisms into the quarters. Obstruction of lactiferous ducts and alveoli with inflammatory debris impedes drug diffusion, therefore, complete evacuation of the quarter/quarters is important. Oxytocin enhances complete evacuation of the mammary gland. Administration of 10-20 I. U. of oxytocin has tremendous value in treating all kinds of mastitis and particularly that caused by coliform organisms. A drug or a combination of drugs giving a wide antibacterial spectrum may be indicated for initial therapy when the causative agent is unknown.

**Supportive therapy :** Good nursing has an important part to play in hastening recovery from severe mastitis. Frequent stripping of the quarter is helpful till such time the veterinary treatment is obtained. Supportive therapy including administration of dextrose saline and antihistamine drugs is advocated when there is excessive tissue damage and toxæmia. Application of cold packs is also helpful to reduce absorption of toxin in such cases.

**Dry-cow therapy :** In most control programmes, antibiotic therapy of all the cows is recommended at the time of drying-off. The treatment of dry-cows is important to reduce intramammary infections and to bring down new infections during the dry period. The treatment of drying-off, therefore, appears to be more rewarding. It may, however, be added that it is a poor practice to commence treatment on a large scale, until measures are taken to prevent further spread of the disease. Chemotherapy of mastitis without proper hygienic programme for its control is rather a waste of time and money. It is said that mastitis control does not lie in the antibiotic tube but rigid system of hygienic control continuously applied is important.



In most mastitis control programmes, treatment of all cows at drying-off with a specially formulated high persistence formulation combined with teat dipping is recommended. For this purpose Floclox-D is available.

**Control :** The control of mastitis involves management, hygiene and treatment.

**Management :** Proper management is very important for maintaining good udder health. The success of programme for the control of contagious mastitis by segregation or by segregation with chemotherapy depends largely upon the extent to which hygienic measures are used to check the transmission of *Str. agalactiae* from infected to non-infected udders. The prevention of non-contagious mastitis and injuries also require good sanitary milking procedures and use of good herd management. The animals which do not respond to treatment should be culled from the herd.

The mammary glands of calves and heifers have been found to be infected with various types of organisms. They may remain dormant without causing any tissue damage, but are present in the milk when the animal freshens. However, at times they damage the udder leading to light or blind quarters. Infections during calthood result from calves suckling each other after feeding raw milk from infected cows. Therefore, suckling among calves should be prevented or milk from infected cows should not be fed unless it is pasteurised.

The act of milking constitutes the principal pathway of spreading infection from infected to non-infected animals. Consequently, infected cows should be milked last.

**Sanitary procedures :** The object of adopting hygienic measures in the control of mastitis is to prevent exposure of the cows teats to pathogenic bacteria. This can be achieved by minimizing their spread during the act of milking. Transmission during milking occurs mostly through milker's hands, cloths and milking machine teat cups. *Staph. aureus* and *Str. agalactiae* are the most likely pathogens to be transmitted at this time. Some organisms like *Str. uberis* and coliforms are transmitted during the inter milking period. The most likely means include contaminated bedding, licking of teats and udders, teat contact with the floors, flies and tail switch.



Insight into the epidemiologic patterns of a disease is important for the development of adequate control measures. Primary reservoirs in herds not using control measures, are infected udders, colonized teat canals and infected teat lesions. It has been observed that most important source of infection with staphylococci was udder itself and that pathogenic staphylococci commonly multiplied on the udder surface as well as inside the udder. Consequently, the control of staphylococcal mastitis is dependent upon control of both intramammary and udder skin infections.

The only known reservoir for *Str. agalactiae* is infected udder. In the infected herds, the organisms have been isolated from air, bedding, milker's hands, milking equipment and other objects. In the absence of intramammary infections, the organism disappears from secondary sites within a few weeks. Tonsils and skin lesions, in addition to infected udders are the main sources of *Str. dysgalactiae*. *Str. uberis* was more frequently isolated from the udder or teat skin than from within the mammary gland. The mammary infection was reported to be secondary to infection of the udder or teat skin or both.

The most important secondary pathogens, such as coliforms and pseudomonas organisms may originate from manure, contaminated water, soil or improperly cleaned milking equipment. Pathogens may also originate from out of the herd sources like new additions to the herd, visitors, relief milkers and flies, etc. Contaminated milker's hands constitute an important vehicle for the transmission of mastitis pathogens. Dipping of hands by the milkers in a suitable disinfectant before handling each cow considerably reduces manual transfer of pathogens.

Disinfection of the teat skin and the milker's hands is usually done by using chemical disinfectants, of which sodium hypochlorite (1%), chlorhexidine (.5%) and iodine compounds (iodophors 0.50%) are the most widely used. The following procedures are generally adopted to control the spread of organisms by using disinfectants :

1. The udder washing before milking.
2. Washing of milker's hands before handling/milking each cow.
3. Dipping the teats in a disinfectant solution after milking.



**Treatment :** The treatment of drying-off with a specially formulated high persistence formulation combined with teat dipping is important to reduce intramammary infections and to bring down new infections during the dry-period.

Treatment, when combined with teat dipping after the last milking of the lactation, led to substantial reduction in the number of new infections, which occurred during the dry-period.

Treatment at the time of drying-off has a number of advantages. Efficacy of treatment is higher than if it is administered during the lactation; slow release base preparations can be used; number of infections occurring during the dry-period is significantly reduced; incidence of clinical mastitis following parturition is reduced considerably and the saleable milk is not contaminated.

## RECENT DEVELOPMENTS ON POST-PARTURIENT HAEMOGLOBINURIA IN BUFFALO

Post-parturient haemoglobinuria (PPH) in buffaloes is an acute haemolytic disease. It is characterized by anaemia, haemoglobinuria with consistent hypophosphatemia.

### Aetiology

Phosphorus deficiency has been the consistent finding in the diseased buffaloes. It has been interesting to note that there has not been any occurrence of the disease in the buffaloes on well managed and organised farms i. e. University Animal Farm attached with College of Animal Sciences, CCSHAU, Hisar and in Progeny Testing Farm, Sirsa Road, Hisar (presently Central Institute of Research on Buffaloes). The plasma inorganic phosphorus (Pi) levels of these healthy buffaloes have been found higher as compared to healthy buffaloes of the field where the incidence of the disease is high. Higher plasma Pi levels in the farm buffaloes can be attributed to regular supplementation of the feed with mineral mixtures. Similarly, mineral mixture supplementation of the feed can be undertaken in the field buffaloes to maintain higher levels of phosphorus. Plasma copper levels have been found within normal limits in the diseased and healthy buffaloes from Haryana.



## Pathogenesis

Concerted efforts have been made in the Department of Veterinary Medicine CCSHAU, Hisar to explain the phenomenon of intravascular haemolysis in the disease. Various erythrocytic enzymes i. e. reduced glutathione, glutathione peroxidase, glutathione reductase, catalase and related parameters i. e. red cell ATP and total phospholipids have been studied in diseased buffaloes and compared with healthy buffaloes of the field and the farm. These studies being the first of its kind have indicated that red cell lysis in PPH is probably of oxidative nature.

In addition Electron Microscopic studies of erythrocytes have also been carried out. These studies again being for the first time in buffaloes have indicated membrane defect in erythrocytes in the disease.

## Treatment

Treatment which has been routinely used is :

Sodium acid phosphate ( $\text{NaH}_2\text{PO}_4$ ) 80 g in 400 ml distilled water as slow I/V injection and 80 g orally twice daily till the urine becomes clear. On an average the treatment is required to be given for 3-4 days.

New therapeutic approach has been evolved in the Department of Veterinary Medicine, CCSHAU, Hisar for PPH in buffaloes. Antifibrinolytic drugs have given very good results in the treatment of haemoglobinuria.

1. Epsilon-amino caproic acid 20 g (Inj. Caprostat (Life Pharmaceuticals) 50 ml) or (Inj. Hemocid (Biddle Sawyer) 80 ml) mixed in 500 ml of 5% dextrose saline as slow I/V injection once daily for two to three days. Epsilon-amino caproic acid (EACA) is antifibrinolytic in action.
2. Inj. Unipamba 30 ml (300 mg para-amino methyl benzoic acid) can also be used as an alternative drug. Unipamba is also an antifibrinolytic. Inj. Caprostat and Unipamba are marketed in 5 ml ampoules while Hemocid is marketed in 20 ml vials.



3. A haemocoagulase Botropase (Juggat Pharma) apparently an antifibrinolytic has also been found effective in the treatment of this disease. Ten ml of Botropase dissolved in 20 ml of normal saline is to be injected slow I/V daily for two to three days. Botropase is marketed in 1 ml ampoules.

An increase in the fibrinolytic activity was thought to be playing a role in PPH in buffaloes so antifibrinolytic drugs were tried to treat this disease. Interestingly, these drugs proved very helpful in curing the disease. These drugs have been tried for the first time in this department for the treatment of PPH.

Another therapeutic approach was adopted with an-antioxidant ascorbic acid on the basis of increase in oxidative stress on erythrocytes in PPH. 5 g of ascorbic acid mixed in 500 ml of normal-saline was injected I/V daily till recovery. This schedule has been found 70% effective on small number of animals. More trials are being continued on large number of affected buffaloes before the drug is used for field applications. Ascorbic acid (Vitamin-C) has also been used for the first time in the treatment of this disease.

Relation of oxidative stress with fibrinolytic activity in PPH is yet to be investigated.

### **Role of oxygen releasers in the treatment of haemoglobinuria**

It has been observed that recovered cases of haemoglobinuria (urine free of haemoglobin) with low levels of haemoglobin die due to severe anaemia. In order to overcome the emergency of anaemic-anoxia, oxygen releasers (Inosine) have been tried and found highly effective. Oxygen releasers reduce the respiratory distress by increasing the uptake of oxygen by red blood cells and releasing more oxygen to the tissues. 500 mg of inosine is to be dissolved in 5 ml of dilute hydrochloric acid (N/10) and then mixed in one bottle of 5% dextrose-saline. This solution can be given as slow I/V injection daily for two to three days. Inosine dissolved in dilute HCl can also be injected simultaneously along with specific treatment in cases with low levels of haemoglobin. Inosine is not manufactured in the country and it has to be imported.

### **Recommended treatment schedule**

Combination of sodium acid phosphate and antifibrinolytic drugs have been found compatible in the treatment of PPH in



buffaloes and gives better results than treatment with either sodium acid phosphate or antifibrinolytic drugs alone. The combination as described below can be used in the treatment of PPH. (Epsilon-amino caproic acid 20 g) (Inj. Caprostat 50 ml) or (para-amino methyl benzoic acid-300 mg Unipamba 50 ml) and sodium acid phosphate 80 g thoroughly mixed in 500 ml of normal-saline to be given slow I/V once daily till the urine becomes clear. Usually, cases will recover with three days treatment.

### Supportive treatment

Supportive treatment consists of preparations of iron, vitamin B-12, copper, cobalt and folic acid as heamatinics. These should be given for 4-6 days as per following dose rate :

(i) Preparations of iron

Inj. Imferon-10 ml I/M daily

or

Ferrous sulphate powder 15 g orally daily

or

Tab. Fersolate..... 20 tab orally daily.

(ii) Preparations of Vitamin B<sub>12</sub> :

Inj. Macrabin—1000 ..... 5ml I/M daily

or

Inj. Macrabin—500.....10 ml I/M daily

or

Other various preparations containing Vit. B<sub>12</sub>.

(iii) Preparations of copper and cobalt :

Tab. Cocu.....10 orally daily.

(iv) Preparation of folic acid :

Tab. Folic acid ..... 10×5 mg orally daily.

Blood transfusion may be done in severe cases of PPH in buffaloes. Oxygen releasers can be used to combat anaemic-anoxia. More percentage of affected buffaloes can be saved if the treatment is undertaken in early stage of the disease.



Diseases/ Condition	Aetiology	Symptoms	Diagnosis
<b>Rheumatism-like syndrome in buffaloes</b>	Disease of multiple aetiology but associated mostly with phosphorus deficiency	<ol style="list-style-type: none"> <li>1. Stiffness of gait</li> <li>2. Emaciation</li> <li>3. Anaemia</li> <li>4. Animal stands with arched back and abdomen is tucked up.</li> <li>5. Hair coat is rough and depigmented.</li> <li>6. Carving of bones.</li> <li>7. Retarded growth.</li> <li>8. Reduced fertility.</li> <li>9. Decreased milk yield.</li> <li>10. Animals in late pregnancy may become recumbent.</li> </ol>	<ol style="list-style-type: none"> <li>1. Symptoms</li> <li>2. Estimation of Ca and P in serum.</li> <li>3. Haematological studies.</li> </ol>



and control

Treatment	Control and prophylaxis	Any other information
1. I/V administration of 400 ml of 20% solution of sodium acid phosphate for 3-4 days and then orally (80 gms daily) till the disappearance of signs.	1. Sodium acid phosphate @ 50 gm per day for a month. 2. Mineral mixture @ 50 gms/day. or Bone meal @ 45 gm/day for a month.	Nil
2. Mineral mixture @ 100 gm daily.	3. Supplementation of concentrate ration with crushed wheat (Daliya) @ 1 kg/day. or Ground barley @ 2 kg/day for a month.	
3. Cobalt sulphate @ 10 mg/day for 21 days.		
4. Bone meal @ 100 gm daily.		
5. Supplementation of Conc. ration with wheat bran.		



## For Veterinary Officers

Diseases/ Conditions	Aetiology	Symptoms	Diagnosis
1	2	3	4
Degnala disease in buffaloes/ cattle	<ol style="list-style-type: none"> <li>1. <i>Fusarium equiseti</i> fungal toxins secreted in rice straw.</li> <li>2. Associated with feeding of contaminated rice straw.</li> </ol>	<ol style="list-style-type: none"> <li>1. Edema/ swelling of dependent parts of body i.e. legs, tail, ears.</li> <li>2. Lameness followed by necrosis/ gangrene of affected parts.</li> <li>3. Ulceration/ sloughing of necrosed/ gangrenous areas.</li> <li>4. Loss of appetite, emaciation, hide bound, recumbency.</li> </ol>	<ol style="list-style-type: none"> <li>1. By clinical signs.</li> <li>2. Mycological examination of rice straw.  -Visually, -Microscopically, -Growth of fungi.</li> <li>3. Demonstration of fungal toxins in the rice straw.</li> </ol>



Treatment	Control and Prophylaxis	Any other information
5	6	7
<p>1. As soon as signs of the disease appear, change the Fodder including rice straw. Fodder for feeding should be taken from other sources.</p> <p>2. Mineral mixture, as a feed supplement, such as Supermindif (Boots), Avlomin (I.C.I), Fidamin C (Khandewal), Minimix (Pfizer) be liberally given to the affected animals. Normally the dose is 25-30 g to be given mixed with concentrate/gur/gram flour.</p> <p>3. Prevent animals from severe cold. Hot fomentation twice a day to extremities (but not to the wound, if any).</p>	<p>1. Provide adequate and nutritious diet to the animals. As far as possible feeding of rice straw should be restricted. Mouldy rice straw should not be fed to the animals at all.</p> <p>2. Mineral mixture, as a feed supplement may be given, particularly to the buffalo stock.</p> <p>3. Animals should be protected from severe cold.</p> <p>4. Animals should be kept under hygienic conditions and ensure regular removal of dung from sheds/rooms. Keep place clean and dry.</p>	<p>1. Stocking of rice straw be made at such places which are away from canal/distributories/ water channels and at a relatively high ground, where there is little possibility of stagnation of water.</p> <p>2. Rice straw should be dried sufficiently before storing.</p>



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4. Anti allergic drugs, such as Anthisan, Phenergan may be given (10 ml of 5% solution I/M, 3-4 injections at 24 hrs. interval).
5. Dress wound a septically. Sulphanilamide paste made with Cod Liver oil 50 mg of acriflavin added to 50 g of paste; or skin ointments like Pendistrin (Squibb), Terramycin (Pfizer), Loraxane or Himex may be used.
6. If required, antibiotic such as Combitre (Pfizer) or Dicrysticin (Squibb) be injected to avoid infections.
7. Arsenical preparations i.e. Arsanilic acid (100 ppm in feed for 2-3 weeks) or Liq. arsenicalis-



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Fowler's solution (10-20 ml in food not more than 6 days).

8. Sodium nitrate as a vasodilator (1-4 gm in 15-20 ml of distilled water S/C for 4 days). Not to be given to the pregnant animals.

**Note :** Measures suggested at 1-4 must be taken immediately. Other measures will depend upon the condition of the affected animals.

8. In weak and emaciated animals, Mifex M. F. C. (M & B) may be given slow I/V (100-350 ml) or S/C (100-150 ml).
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## For Farmers

Diseases/ Condition	Aetiology	Symptoms	Diagnosis
Degnala disease in buffaloes/ cattle	<ol style="list-style-type: none"> <li>1. Fungal toxins in rice straw.</li> <li>2. Occurs in winter season.</li> </ol>	<ol style="list-style-type: none"> <li>1. Disinclination to move.</li> <li>2. Swelling of lower parts of legs resulting into frank lameness.</li> <li>3. Loss of appetite and animals become weak/emaciated.</li> <li>4. Affected parts painful to touch.</li> <li>5. Necrosis/gangrene of affected parts.</li> <li>6. Ulceration and wound formation.</li> </ol>	<ol style="list-style-type: none"> <li>1. By symptoms.</li> <li>2. By visual examination of rice straw.</li> <li>3. It becomes mouldy, moist and there are black/white spots.</li> </ol>



Treatment	Control and prophylaxis	Any other information
<ol style="list-style-type: none"> <li>1. Symptomatic</li> <li>2. Provision of warm and hygienic environment.</li> <li>3. Restricted feeding of rice straw.</li> </ol>	<ol style="list-style-type: none"> <li>1. Stoppage of feeding of rice straw.</li> <li>2. Feeding of adequate nutritious diet along with mineral mixtures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure feeding of completely dried and clean rice straw to the livestock.</li> <li>2. Rice straw should be stocked at higher ground level, roof tops where water should not get accumulated.</li> <li>3. Immediately with onset of disease, change the fodder.</li> </ol>



## For Farmers

### Disease prevention

Diseases/ Condition	Aetiology	Symptoms	Diagnosis
Rheumatism- like syndrome in buffaloes (Gathia-Ba)	Associated with phospho- rus deficiency	<ol style="list-style-type: none"><li>1. Licking of walls and soil.</li><li>2. Difficulty in getting up and moving.</li><li>3. Recumbency.</li><li>4. Skin rough.</li><li>5. Poor health.</li><li>6. Decreased milk yield.</li><li>7. Delayed maturity.</li></ol>	Nil



and control

Treatment	Control and prophylaxis	Any other information
1. Consult Vety. doctor.	1. Sodium acid phosphate @ 50 gm per day for a month.	Nil.
2. Give sodium acid phosphate @ 100 gms daily in feed.	or Mineral mixture @ 50 gms/day	
3. Mineral mixture @ 100 gms daily.	or Bone meal 45 gm/day for a month.	
4. Supplement concentrate ration with wheat bran.	2. Supplementation of concentrate ration with crushed wheat (Daliya) @ 1 kg/day.	
5. Bone meal @ 100 gms daily in feed.	or Ground barley @ 2 kg/day for a month.	



# COMMON BACTERIAL, VIRAL, FUNGAL AND PARASITIC DISEASES

## BLUE-TONGUE (BT)

An infectious, noncontagious, insect transmitted disease of sheep, cattle and goats characterised by high rise in temperature, salivation, oral hyperaemia, erosions and ulceration of lips and tongue.

**Cause :** BT is caused by double stranded RNA virus belonging to the family reoviridae.

**Hosts :** Sheep, goat, cattle, buffaloes and wild ruminants.

**Symptoms :** In acute and subacute form of disease, animals are depressed, have fever, leukopenia, salivation, oral hyperaemia, congestion and swelling of mucous membranes, erosions and ulceration of lips and tongue, inflammation of coronary bands. The inflammation of coronary bands may lead to lameness and sloughing of hooves. Pregnant animals may abort, sometimes cyanosis of tongue may be observed.

**Transmission :** The blue-tongue virus is transmitted by insect vector. Culicoides the virus multiplies in the salivary glands of the insects. When such insects bite the healthy animals, the disease is transmitted. BT is not transmitted by contact. The disease can be transmitted from an infected pregnant mother to foetus. Infected bulls shed virus in their semen and act as carriers.

### Diagnosis

1. Clinical typical BT symptoms
2. Laboratory tests
3. Blue-tongue virus isolation

**Treatment :** Symptomatic and antibiotic treatment to prevent secondary bacterial infections.

### Prevention and control

1. No vaccine available in India.
2. Control of insect vector will help in prevention of the disease.



3. House animals in dry places away from breeding site of the vector.
4. Introduce new animals in your flock/herd after getting them tested for BT.

**Any other :** Information regarding the disease may be sent to the blue-tongue laboratory, Deptt. of Veterinary Microbiology, CCSHAU, Hisar.

**Sample collection for BTV isolation :** Blood should be collected in vials containing anticoagulants (available from the Deptt. of Vety. Microbiology) at the time of high rise of temperature. The blood sample should be immediately transported to this department for further testing.

## FOOT AND MOUTH DISEASE

It is an acute, highly contagious disease of cattle, buffalo, sheep, goat and pigs and is characterized by fever, formation of vesicles and blisters in mouth, muzzle, feet, teats and udder.

**Economic loss :** The disease causes loss of approximately Rs. 500 crore per year.

**Causes :** The disease is caused by a virus, which is a stable virus and can remain viable on dry grass or hay for weeks or months.

### Symptoms

- Mouth :**
1. Continual salivation
  2. Smacking of mouth
  3. Vesicles on tongue, gums
  4. Difficulty in eating.

- Feet :**
1. Vesicles between the toes
  2. Lameness

- Others :**
1. General weakness
  2. Vesicles on teat
  3. Reduction in milk



**Spread :** The disease usually spreads by three factors : 1. Cattle fairs. 2. Migration of affected animals from one place to another and 3. Intermixing of affected and healthy animals at common grazing grounds.

### **Diagnosis**

1. By its characteristic symptoms
2. By laboratory confirmation

### **Treatment :**

**For mouth lesions :** 1. Wash with potassium permanganate (0.03%) or boric acid (1.5%) or alum (1.5%).

**For feet lesions :** 1. Wash with phenyl solution (4%).  
2. If maggots- to be removed by forceps.  
3. Dressing of the affected part with zinc oxide or copper sulphate (4%).

### **Control**

1. The affected animals may be separated from the healthy animals.
2. Persons looking after affected animals should avoid looking after healthy animals.
3. The infected bedding, straw etc. may be burnt.
4. The nearest Veterinary hospital may be contacted for guidance and help.

**Prevention :** Regular vaccination with polyvalent foot-and-mouth disease vaccine may be done on the advice of the veterinarian. The vaccine is available in the market or the nearest veterinary hospital be requested to make arrangements for its procurement (under subsidy programme). The schedule of vaccination may be followed as per the recommendations of the manufacturers.

**Any other information :** Regional Centre on Foot-and-Mouth Disease located in the Deptt. of Veterinary Microbiology is responsible for identification of the type of virus involved so that



our vaccine can be kept up-to-date. For any problem on this disease, nearest veterinary hospital may be contacted or information may be sent by post or in person to the Officer-in-charge (Foot and Mouth Disease), Deptt. of Veterinary Microbiology, College of Veterinary Sciences, CCS Haryana Agricultural University, Hisar.

## INFECTIOUS BOVINE RHINOTRACHEITIS

Acute rhinotracheitis with discrete nasal lesions, respiratory problems, coughing, ocular and nasal discharge, high fever for 3-5 days. Pregnant animals may abort, there may be enteritis and encephalitis in young calves.

**Cause :** Caused by a virus.

### Symptoms

1. Respiratory disorder (pneumonia)
2. Conjunctivitis
3. Abortion in pregnant animals
4. Mild to high fever
5. Enteritis and encephalitis
6. Balanoposthitis in male
7. Pustular vulvo-vaginitis

### Diagnosis

1. By its characteristic symptoms
2. By laboratory confirmation

### Treatment :

Antibiotic treatment to combat secondary bacterial infections.

### Control :

1. Isolation of affected animals.
2. Persons looking after affected animals, should avoid looking after healthy animals.
3. Proper disposal of aborted fetus, placenta and other infected materials.



4. Contact the nearest veterinary doctor/institution for guidance and help.

## Prevention

1. No vaccine in India is available for this disease.
2. Proper hygienic conditions and separation of animals must be done at the farm. Suspected cases should be immediately referred to Deptt. of Vety. Microbiology, CCSHAU, Hisar for diagnosis and suitable preventive measures.

**Any other information :** Recovered animal may carry the virus in latent form and may be a good source of infection to other healthy animals. Recovered animals which are apparently healthy but may shed virus in semen or milk and hence need watchful attention for at least 2-4 years.

## NEONATAL DIARRHOEA AMONG DOMESTIC ANIMALS

**Introduction :** Successful rearing of neonates of domestic animals is both a science and an art. The veterinarians/farmers should, therefore, have good knowledge of the diseases affecting calves, as well as their management and nutrition. The losses on account of diarrhoea (colibacillosis) can be very severe and may reach 100% during a season on a given farm, particularly during first two weeks of life.

**Causes :** The commonest cause is pathogenic *Escherichia coli* bacteria and a virus called rota chiefly during the first two weeks of life. Other causative agents are salmonella bacteria, coronavirus and some protozoa.

## Symptoms

### A. Colibacillosis

There are three forms of colibacillosis.

- (i) The colisepticaemic form :

- This form kills the animals within 3-6 days after birth.
- Newborn calves suddenly cease drinking.

- Prostration
- Unable to stand and the eyes have sunken appearance.
- The respiratory and heart rates are elevated.
- Onset of rapid dehydration which leads to death.

(ii) The enteric form (White scours) :

- Diarrhoea is the most prominent sign.
- Dehydration varying from mild to severe.
- The colour of faeces is yellow or grey-white and is fluidy.
- The sick calves do not die rapidly, they may remain ill for weeks without gain of body weight.

(iii) The entero-toxaemic form :

- Occurs in individual cases.
- The onset is very sudden with collapse and extreme prostration.
- No diarrhoea.
- Death occurs usually within 6 to 16 hour of the onset and the animal loses its muscle tone and becomes paralytic.

## B. Salmonellosis

- Young calves during the first 2 weeks of age show sudden loss of appetite, weakness, diarrhoea and death in a few days.
- Fever (104 to 105°F) between 2 and 6 days after infection.
- In acute cases the faeces may be blood stained and mucoid/watery with offensive smell.
- Calves become gradually weak, dehydrated, emaciated with arch back and rapid shallow respiration.
- Some calves may show lameness due to the involvement of joints.

## C. Virus Associated Diarrhoea

- Can occur between 3 days to 2 months of age.
- Not possible to differentiate it clinically from the above bacterial diarrhoea.



## Diagnosis

- Clinical symptoms.
- Diarrhoeic animals show varying degree of dehydration.
- Examination of diarrhoeal faeces for bacteria and virus and for antibiotic sensitivity in the Deptt. of Vety. Microbiology and for protozoa in the Deptt. of Parasitology at the CCS Haryana Agricultural University, Hisar for final confirmation.
- Treatment of diarrhoeic cases with electrolyte (Salt sugar) solutions.
- The oral antibiotics should not be used for treatment of diarrhoea indiscriminately.
- Advice on the use of antibiotics should be sought from a laboratory/practising veterinarian on the basis of sensitivity of bacterial culture.

## Prevention

- Ensure that the newborn gets colostrum as early as possible after birth (within first 2 hours or even less) without waiting for the removal of the placenta.
- The newborn calf should be left with the cow for at least first 2 days as this contact improves the absorption of immunoglobulins from the colostrum responsible for the prevention of diarrhoea.
- Feed the calf regularly with milk not exceeding 10% of the calf's body weight per day.
- Regular cleaning and disinfection of premises used by neonatal calves is necessary.
- Remove sick calves from the group. They may be replaced on recovery.
- Purchase of calves should be from as few sources as possible and liaison maintained with those sources over matter of management and feeding.
- New calves arrived from other places at the farm should be kept separately.
- Cleaning and disinfection of reception buildings should be carried out in batches.
- All diseased calves should be treated at the earliest possible and not to wait for the sake of its companions.

## For the use of Farmers

- Newborn calves should be fed colostrum or allowed to suckle their dams as early as possible within 2 hours without waiting for the removal of placenta.
- The calf should have two feedings of colostrum (one quart) during first 8 hours of life.
- Tincture iodine should be applied to the navel of the newborn.
- The calf should be examined for physical abnormalities.
- Appropriate housing should be provided.
- Uniformity in feeding and cleanliness should be maintained.
- Inform the nearest veterinarian immediately on the death of the first calf for early diagnosis of the disease.
- Use electrolyte solutions and avoid the use of antibiotics.
- For specific treatment of bacterial/parasitic infection, contact the nearest veterinary doctor.

## Ring worm

**Aetiology :** It is caused by a group of fungi known as dermatophytes.

**Symptoms :** Ring worm is the common name given to the superficial infections of the skin and its appendages (hair, feather, horns etc.) of animals and birds. Man is equally susceptible to this condition and the disease is easily transmitted from animals to human being. The disease is characterized by appearance of almost circular lesions of about 1 cm or more in diameter on skin. There is loss of hair and scaliness, the lesions may develop thick yellowish white crusts.

**Diagnosis :** The diagnosis of this condition is made by examining the skin scales microscopically as well as by culturing the causative agents on various laboratory media.

**Treatment :** Captan is the most effective and cheap drug for the treatment of ring worm in animals. It is a plant



fungicide and is used as a spray by dissolving 5 g of captan in one litre of water. The solution is sprayed over the body of animal with the help of spray pump. Each animal may require 4-5 litres of solution. The treatment is repeated after one week with fresh solution of the drug. Only two sprays are sufficient to completely cure the animal.

- Control :**
1. The affected animals may be separated from healthy animals.
  2. The affected animals may be treated as early as possible.
  3. The walls and soil of the area where animals are kept may also be sprayed twice with captan.
  4. Over crowding may be avoided.
  5. Care must be taken (good hygienic measures) so that the disease does not spread to people associated with affected animals.

**Any other information :** The Department of Veterinary Microbiology provides diagnostic facilities. For this, skin scrappings should be collected from the margins of lesions by light scratching with a knife. The scales may be collected in a clean paper which in turn may be put in some envelope and be sent to this department by person or by post.

## **Ectoparasites**

There are four most important ectoparasitic conditions of livestock in Haryana namely (i) Tick infestation, (ii) Mange or mite infestation, (iii) Maggot infestation and (iv) Lice infestation.

### **(i) Tick infestation**

Ticks are the most important ectoparasites and affect all species of livestock. Varying numbers may be found attached on host body or hidden in animal houses. Their intensity increases during summer and rainy seasons.

**Aetiology :** There are six genera and 12 species of ticks which have been encountered in Haryana in livestock and poultry.

The genera are (1) Hyalomma, (2) Boophilus, (3) Rhipicephalus, (4) Haemaphysalis, (5) Nosomma and (6) Argas. Of these, the first two are most common by found. Argas affects poultry. More than one species of ticks may parasitize a host species.

**Symptoms/effects of ticks :** It has been observed that 100 ticks can suck nearly 100-150 ml of blood daily and thus cause anaemia, weakness, loss of working capacity and reduction in milk yield. They also cause irritation, worry, toxicosis to the animal and loss in value of hides. Moreover, ticks transmit haemoprotozoan diseases such as theileriosis, babesiosis and anaplasmosis which are major animal health problems throughout the tropics and subtropics. Exotic breeds and their crosses are specially prone to the effects of ticks and tick borne diseases.

**Diagnosis :** Ticks can infest any part of the body but the common sites are groin, perineum, udder/scrotum, perianal region, tail and ears.

**Treatment and control :** Individual animal can be effectively treated by the application of any one of a number of insecticides either as spray or hand dressing or by dipping. In the last two decades, chlorinated hydrocarbon insecticides (e. g. DDT, HCH, toxaphene etc.), have been used extensively against all species of ticks. But these often leave residual effect in the animal body and through milk and meat may affect human health adversely. So, now-a-days greater emphasis is placed on the organophosphorus compounds, carbamates and synthetic pyrethroids. Following are some insecticides that can be used as spray.

Insecticide chemical name	Trade name (Company)	Per cent Conc.
1. Coumaphos	Asuntol 50 (Jagat Chemicals)	0.1
2. Fenvalerate	Sumicidin 20% EC (Rallis India Ltd.)	0.5
3. Diazinon	Neocidol 20% EC (Hindustan Ciba-Geigy Ltd.)	0.025
4. Cypermethrin (EC)	Cymbush (ICI) or Cyperkill	150 ppm
5. Deltamethrin	Butox (Hoechst India)	25 ppm



The spray should be done on whole of the body. It should be repeated after every two weeks till all the ticks get killed. The dilution should be freshly prepared each time. About three litres are needed for each adult cattle.

In endemic regions protective measures should be instituted during or just before the season of abundance (i. e. summer). We can attempt to reduce the tick population by various methods other than application of insecticides.

(1) **Animal house :** Keep the animal house clean and avoid cracks and crevices as the ticks lay their eggs there. So, burn them with blow lamp or spray the animal house with the suitable insecticides once after every fortnight between April and September.

(2) **Purchase of new stock :** Before putting the new entrants in the animal house, be sure that they are free from ticks.

(3) **Rotation of pastures/pasture spelling :** In case of animals which go for grazing in pastures (only in organised farms in India) it is advisable to change the pastures after some time. Because after feeding, ticks drop off on the ground and after moulting seek another host for attachment. If they will not get suitable host for some time, chances are there that they might get killed by starvation or climatic effects or leave the place. Vegetation should also be removed especially near the animal house as larval stages of ticks remain hidden on them.

(4) **Cultivation of land :** This undoubtedly tends to reduce tick life by controlling the movements of domestic and wild animals as well as by creating conditions unsuitable for ticks as for instance, exposure of eggs to sunlight, or burying them deeply by ploughing. Good drainage helps to reduce the humidity on which the ticks depend.

(5) **Selective breeding :** Breeds of cattle differ in their innate resistance to tick infestations. Indigenous cattle are highly resistant. Of the imported cattle, Jersey breed is more resistant than the Holstein-Friesian.

(6) Measures such as biological control, release of sterile hybrids and vaccination are presently in experimentation.



## (ii) **Mange/Mite infestation**

The second most important ectoparasitic condition affecting livestock in Haryana is mite infestation. The condition is known under various names, viz., mange, scabies, scab, itch and acariasis etc. In local language it is called "Khaj" or "Kharis" and in camel called "Paam". Infection spreads by direct or indirect contact and sarcoptic mange can be transmitted from animal to man.

**Aetiology :** Parasitic mites are small acarines which can be seen with difficulty by naked eye but can be easily seen by magnifying glass or under the stereoscope. Important mites affecting livestock are (1) Sarcoptes, (2) Psoroptes and (3) Demodex.

**Sarcoptic mange :** The mites belonging to Sarcoptes genus are parasitic on a number of different domestic (especially camel) and wild mammals causing mange. It forms tunnels in the host skin. Life cycle is completed in about 17 days.

**Symptoms :** The lesions are seen on chest, belly, neck, head, face and around the eyes. There is intense irritation on the affected part and animal rubs that part against wall, tree or any other hard object. The skin becomes thickened and wrinkled and hair are lost. The disease may spread to whole body in camel. Camel even bites the affected part and rubs against hard objects and may get injured. Gradually it becomes weak as the disease persists for months. Deficiency of vitamin A due to lack of green fodder weakens the skin and such camels suffer more. There is also relationship of surra and mange in camel.

**Psoroptic mange :** These mites affect sheep, cattle, buffalo and horses. In buffaloes they primarily affect at the base of horn and its surroundings and later on can spread over the whole body. These mites remain on the skin surface. Usually the life cycle is completed in about 10-12 days.

**Symptoms :** Psoroptic mange in buffaloes does not cause mortality but keeps the animal restless as the animal strikes its horn against the manger and hard objects continuously to allay itching and such animals are known as "Khoonta thok" in Haryanvi dialect. The restlessness impairs the utility of the animal. Since the infected animals apparently look healthy, the owner of the animals does not pay much heed to them and suffers an economic loss unknowingly.



In sheep, scab lesions may occur on all parts of body that are covered with wool or hair but mostly around the shoulders along the sides of the body, back, the sternum and the dorsal aspect of tail. In the affected part serum oozes out which coagulates and forms yellow crust and finally the wool is lost. The mites then shift to new areas thereby extending the lesions.

**Demodectic mange :** This is a very specialized group of parasitic mites which live in the hair follicles and sebaceous glands of various mammals especially dogs causing demodectic or follicular mange. The life cycle is completed in 18-24 days.

**Symptoms :** Lesions initially occur on the head and forelimbs and then spread over the entire body. Two forms of disease are usually recognized in dog, namely (a) squamous form and (b) pustular form. In cattle mostly pustular or nodular form of disease is seen. In squamous form there is alopecia, thickened and wrinkled and copper red coloured skin. In the pustular demodectic mange, small pustules are formed in the hair follicles and sebaceous glands. After development, these pustules discharge blood stained pus containing the mites. This pus later dries to form crust. In extensive form of canine demodectic death results from toxæmia and emaciation. In cattle, the value of hide is lowered. In goat, the pustular form is most common. In sheep, the disease is rare.

**Diagnosis of mange :** (1) Symptoms are highly typical and in most cases sufficient for diagnosis. (2) Skin scrappings for the demonstration of parasite or its eggs may be done for confirmation of parasite if required. For sarcoptic mange especially, deep scrapping with blunt knife should be taken.

**Treatment and control :** Any one of the following acaricidal treatments may be used :

1. Gamma-HCH (Lindane) as wash, dip or spray in 0.05% conc.
2. Ascabiol (E), May and Baker Ltd. (It is 20% of the Benzyl benzoate in the form of oil in water emulsion). Applied topically once in 3 days for five times.
3. Fenvalerate (Sumicidin 20% EC, Rallis India Ltd.) @ 0.05% spray.

4. Diazinon (Neocidol 20% EC, Hindustan Cibe-Geigy Ltd.) @ 0.025% spray.
5. Deltamethrin (Butox, Hoechst India) @ 25 ppm spray.
6. Cypermethrin (EC) (Cymbush, ICI or Cyperkill) @ 150 ppm spray.

**Note :** For psoroptic mange, one or two sprays of the above insecticides at 10 days interval are sufficient, whereas for sarcoptic and demodectic mange, three or more sprays at 10 days interval are required. Repeat treatments are essential to kill the larvae hatching from eggs.

7. Ivermectin injection 1% solution (Ivomec, Dynamic Pharmaceuticals) @ 1ml/50 kg body wt. only by s/c route. It is additionally effective against round worms also.

**Prophylaxis :** General control measures include supportive nutrition and good hygiene of the animal as well as animal sheds. Keep the diseased animal separately and treat it and disinfect its premises, clothings, utencils, etc. completely.

### (iii) **Maggot infestation/Myiasis**

It is defined as infestation of live human and vertebrate animals with larvae which at least for a certain period feed on the host's dead or living tissues.

**Aetiology :** Blow flies i.e. *Chrysomya bezziana*, *Lucilia* and *Calliphora*, out of which *C. bezziana* is most common in Haryana.

**Symptoms :** In individual cases of maggot infestation, a maggot infested wound seems like a honeycomb when dry and shows air bubbles on the surface when moist. Long woolled sheep should be carefully examined as the maggot infested wound may be completely hidden in wool.

**Diagnosis :** (1) By symptoms (2) The presence of maggots in the wound is usually apparent.

**Treatment :** Curette the wound properly and remove the maggots and necrosed tissues. Then plug it with chloroform and turpentine oil in equal parts kept in a bottle. Next day when



plug is removed, the remaining maggots can be picked up. When all the maggots have been killed, then apply antiseptic dressing. Another approach is that after curetting the wound properly, wash it with phenyl lotion. Then put pure phenyl swab for 2-3 days in the wound to kill the maggots present in deep flesh.

**Control :** During summer and rainy seasons all wound including shearing, docking, castration and fresh navels in new borns must be immediately treated prophylactically and the carcasses should be burnt or buried deep after treatment with insecticides. Cleanliness and sanitation of animal (by grooming, washing, etc.) and its sheds are important. Treatment of maggot infested cases and killing of maggots recovered from the wounds, to prevent them from giving rise to adult flies are essential.

#### (iv) Lice infestation

Lice are permanent ectoparasites affecting animals and birds. They are host specific and spread by contact. Life cycle is completed in 2-3 weeks.

**Aetiology :** They are mainly of two types namely (1) biting lice and (2) sucking lice. The biting lice feed on the epithelial debris of the skin (so, less harmful) while the sucking lice suck blood and tissue fluids (so, more harmful).

**Symptoms :** They are most numerous in winter possibly because of longer hair on the host's coat and closer contact of animals. These cause irritation and the hosts become restless and do not feed or sleep well and they may injure themselves or damage their feathers, hair or wool by biting, scratching, rubbing or licking the parts of their bodies. The egg production of birds or milk production of cattle may fall. In case of calves and sheep excessive licking may lead to formation of hair balls and wool balls, respectively.

**Diagnosis :** Diagnosis is easily made by finding the lice or by detecting the eggs or nits on the hair or feathers.

**Treatment :** Affected animals can be effectively treated by spray or dips with general purpose organophosphorus agents like malathion EC (0.5-1% dil.), asuntol WP (0.1% dil.) and diazinon EC (0.5% dil.). Dips or dusts containing chlorinated hydrocarbon



(though less popular now-a-days) insecticides (e.g. lindane, toxaphene, dieldrin, etc.) may also be used effectively. For poultry a dust bath of 5.0% malathion (WP) or 5.0% sevin (WP) should be used instead of spray. Treatment to be repeated after 2-3 weeks.

**Control :** Separate and treat the lice infested animal. Treat all the animals and spray the animal sheds before the onset of rainy season.

A healthy, well-nourished animal is less prone to large scale ectoparasitism. Exercise and grooming are also helpful. General hygienic measures contribute by eliminating or reducing the breeding grounds of arthropods in and around the animal houses.

### **Fascioliosis in Livestock**

Fascioliosis is a disease of ruminants especially cattle, buffaloes, sheep and goats. It is commonly known as liver fluke disease and occurs in low-lying districts of Haryana State. It is responsible for poor health and lowered production in animals.

**Aetiology :** *Fasciola gigantica* is located in the liver, gall bladder and bile ducts of infected animals. The intermediate host of this parasite is aquatic snail namely *Lymnae acuminata*.

**Epidemiology :** Inadequate drainage in low lying areas of Haryana have created conducive conditions for aquatic snails to persist and perpetuate. The aquatic snails get infection from the developmental stage of *Fasciola gigantica* egg. The infected snails shed cream coloured metacercariae which adhere to the aquatic weeds/grass. These weeds are succulent which attract animals when brought for watering. The high incidence of fascioliosis in animals in Haryana has been recorded without any seasonal pattern. The ecological conditions, such as artificial lakes, inadequate drainage of rain water, canals etc., forming ideal habitats for the intermediate host, influence the incidence pattern of the disease.

**Symptoms :** Clinical examination of the animals revealed symptoms like bottle jaw, foetid diarrhoea, anaemia, partial anorexia, wasting with normal to subnormal temperature.

**Diagnosis :** The suspected animals should be faecal sampled and examined in the laboratory for *Fasciola* eggs. The haemoglobin and packed cell volume will reveal anaemia.



The postmortem of sick animal may give a correct diagnosis of fascioliosis by critical examination of liver, gall bladder and bile ducts for the presence of liver flukes. If the animal has been dead for some time, flukes may have passed into the small intestine and it will be necessary to examine this also.

**Treatment :** Anthelmintics like ZaniI, Nilzan (ICI), Trodax (W & B), Fasinex (Ciba-Geigy) and Ranide (MSD AGVET) at the recommended dose rate are very effective in removing flukes from the animals. In endemic areas, the medication will have to be repeated at every 30-40 days interval.

**Prevention :** It appears that *L. acuminata*, the intermediate host of liver fluke, could establish in stagnant, shallow water accumulated in unlined channels filled with aquatic weeds. It is advised that water channels be lined and should be kept free from weeds. During the monsoon and post-monsoon season, the animals of endemic areas should be treated at 30-40 days interval, whereas in non-endemic areas only *Fasciola* positive animals should be treated with suitable anthelmintic.

## PARASITIC DISEASES OF CALVES

Calves are very susceptible to parasitic diseases and a high morbidity and mortality could be attributed to worm infestation. Faecal and postmortem examination of large population of calves from Karnal, Kurukshetra, Ambala, Jind, Rohtak, Sonapat and Gurgaon districts, during the year 1975 to 1984, revealed high incidence of parasitic infections in calves upto six months of age.

**Aetiology :** The important helminth parasites encountered included *Neoascaris vitulorum*, *Strongyloides papillosus*, Strongyles, members of the family Anoplocephalidae and coccidia. The incidence and severity of infection is relatively high in calves upto three months of age which gradually taper off with increasing age of the animals. Observations suggest that mixed infection of *N. vitulorum*, *S. papillosus* and coccidia is the most pathogenic combination inflicting ill-health and deaths in young calves.

**Clinical symptoms :** Since parasitic infection in calves is invariably mixed, clinical symptoms cannot be attributed to any specific parasite. On the contrary, there might be a synergistic pathological effect of different parasites aggravating the clinical



symptoms. *Neoascaris vitulorum* infection is manifested by anorexia, wasting, diarrhoea, pica, tympany, intestinal colic and frequently strong butyric odour of the breath. The infection is often complicated by coliform organisms resulting into white scours. Infection of *S. papillosus* causes dermatitis, alopecia, intermittent dysentery and retarded growth. Clinical symptoms of coccidiosis include diarrhoea, dysentery, anaemia, weakness, emaciation and inappetence. The above symptoms are aggravated when the infection is superimposed by strongyles, *T. ovis* and tapeworms. In general, parasitic infection is responsible for anorexia, diarrhoea and anaemia which is often associated with weight loss or reduced growth rate.

**Diagnosis :** The clinical symptoms mentioned above are not very reliable, therefore, faecal examination is essential for diagnosis. Salt floatation technique may be used under field conditions, however, for want of adequate facilities and expertise, faecal samples may be sent to the nearest diagnostic laboratory.

**Treatment :** Piperazine salts are commonly used as dewormer under the erroneous impression that the calves are only infected with *N. vitulorum*. However, as evident it is the mixed infection which is more prevalent. Therefore, it is pertinent to use broad-spectrum anthelmintics (Albendazole, Fenbendazole, Mebendazole etc.) with high efficacy against ascarids, strongyles, tapeworms and *T. ovis*. The treatment should be repeated religiously every month till the calves are six months old (first dosing be carried out at the age of 15-20 days).

Most coccidiostats used in avian coccidiosis are of limited value in bovine coccidiosis and are toxic to calves. Sulphamezathine (ICI) or Sulmet (Cynamid), at the recommended dose rate has proved consistently useful for the treatment of bovine coccidiosis.

**Control :** It is difficult to suggest practical ways to curb the incidence of parasitic diseases in calves. For example *N. vitulorum* infection is either transplacental or transcolostral and nothing can be done. However, exposure to *S. papillosus*, strongyles, tapeworms and coccidiosis may be minimised by maintaining clean surroundings. It is advised to remove faecal material daily and to scrub the floor thoroughly with boiling water. In addition, calves should not be grazed on low lying and marshy land which provides ideal habitat for preparasitic stages to develop and survive.



# REPRODUCTIVE DISORDERS

## ANOESTRUS

After the onset of puberty, females of most domestic species continue exhibiting rhythmic activity of their reproductive system called the oestrous cycle unless interrupted by pregnancy. Failure of oestrous cycle in pubertal heifers and post partum cows is termed anoestrus and is the main cause for infertility in indigenous livestock. High incidence of anoestrus adversely affects the profitability of our dairy farmers by prolonged intercalving periods, loss of production and increased cost of maintenance.

Anoestrus which remains a dilemma is only a clinical manifestation of many conditions that may affect ovarian activity. It could be the result of various interacting factors like nutritive intake, hormonal profile, age, breed, body weight, season and climate complex, disease, post partum interval, heat detection method, milk yield, suckling effect and management. These factors in one or the other way may culminate into stress and result into ovarian inactivity. Because anoestrus is a multifactorial problem, therefore, obtaining complete history of individual animal, critical evaluation of husbandry practices and heat detection system, careful clinical and physical examination of all the animals, raised energy levels of feeding and regular sexual health checks may go a long way in keeping anoestrus to the minimum and raising reproduction and production to an optimum level.

From clinical point of view, anoestrous cows or heifers may be divided into two classes :

- (i) With functional ovaries : Functional corpus luteum on one of the ovaries.
- (ii) With nonfunctional ovaries : Small smooth ovaries with no functional structure.

Presence or absence of corpus luteum in the ovaries is all important in further dealing with the case, therefore, careful repeated examination may be necessary to ascertain functional status of ovaries.



Anoestrous condition with functional ovaries is seen in pregnancy; retained corpus luteum associated with uterine pathology (pyometra, mummified foetus); silent, weak or sub-oestrus; unobserved oestrus and cystic ovarian diseases. In some cases repeated rectal examination may be required to arrive at accurate differential diagnosis and decide the line of treatment. Manual removal of C. L. is some times difficult and is not advised generally. PGF<sub>2</sub> alpha 25-30 mg or its synthetic analogues (500 µg) may be very useful in many instances by virtue of their luteolytic action. While improved management should help in silent/suboestrus cases, heat may be induced by double injection of PGF<sub>2</sub> alpha (10 days apart) and blind insemination adopted in real problem animals.

Pubertal anoestrus with non-functional ovaries may result from anatomical abnormalities such as ovarian hypoplasia, freemartin, intersex and other congenital abnormalities. Marked weight loss and lack of thrifty condition could also result in anoestrus condition in heifers. In post partum cows anoestrus may develop secondary to chronic or debilitating diseases and negative energy balance (low plane of nutrition) denoted by no gain in body weight. Calf suckling and season (in buffaloes) may also cause acyclic condition in many cases. High energy intake, supply of good quality green fodder, supplementation with mineral mixtures containing trace elements, improved management and veterinary care may prove fruitful in reducing incidence of anoestrous cases.

## PROLAPSE OF VAGINA IN COWS AND BUFFALOES

### Incidence, Predisposing Factors and Symptoms

Protrusion of a part or complete vagina through vulva is common in pluriparous buffaloes. Heavy deposition of perivaginal fat, large and flaccid vulva and vaginitis predispose to prolapse of vagina. Prolapse of vagina is hereditary in few breeds of cattle. Typically, prolapse of vagina occurs during a few days to 2 to 3 months prior to parturition. Clinically prolapse of vagina has been classified into four categories :

1. First-degree prolapse—Vagina protrudes intermittently when the animal is lying down. Vagina is exposed to sun, wind, dust, environmental temperature and contamination of urine and faeces leading to irritation, tenesmus and usually leads to next stage.



2. Second-degree prolapse—Vaginal floor is in continuous prolapse and if not treated bladder may be reverted interfering with urination.
3. Third-degree prolapse—The cervix and entire vagina is prolapsed and occurs in animals with chronic cervical enlargement.
4. Fourth-degree prolapse—Chronic prolapse of vagina with deep necrosis and adhesions with perivaginal tissues and bladder.

## **Treatment**

### **I. Replacement of Vaginal Prolapse**

Prolapsed mass is cleaned and reduced in size by using cold alum solution after proper lubrication and liberal use of anti-septic/antibiotic ointments. The organ is subsequently returned to its natural position using fist to prevent bruising with the finger tips under epidural anaesthesia.

### **II. Retention of Replaced Vaginal Mass**

- (a) Halsted pattern—A series of umbilical tape sutures using the Halsted pattern is placed just dorsal to dorsal commissure and along the vulvar cleft. The sutures enter and exit through the thick skin at the hairline lateral to each vulvar lip.
- (b) Aodified quill technique—Widely placed mattress sutures encircle vertically placed “quills” or the rubber tubing or rope.
- (c) Bunner method—Perineal region is scrubbed and disinfected under epidural anaesthesia. A horizontal skin incision, approximately 1 cm long, is made midway between the anus and dorsal commissure of vulva. Another horizontal incision approximately 1.5 cm along, is made at the same level at the ventral commissure of vulva and cranial to it.

The bunner needle is introduced through the lower incision with the curvature directed in a lateral-medial direction. With one hand in the vagina for guidance, the needle is embedded in the deep subcutaneous tissue, forced as far cranially as possible and



dorsally through the dorsal incision until the needle eye is well exposed.

A piece of antibiotic—soaked Bunner suture tape (elastic tape 1 cm wide) approximately 40 cm long, is threaded through the needle. While holding one end of the tape, the needle is withdrawn ventrally and the tape is removed from eye of the needle. The same procedure is repeated on the opposite side. The suture is tightened to permit entry of two or three fingers into the vulva, and a square knot is applied to maintain the closure.

If the animal is close to calving, the blow knot is preferably used and can be untied and gentle digital dilation of vulva will reduce the tension.

Repeated calcium therapy, starting with 200 ml S/C on the first day, and subsequently on alternate days @ 150 ml I/V till the animal is cured, is essential to build the tonicity of the vaginal wall.

The owners are advised to keep the animals on luxative diet, avoid excessive feeding of dry fodder to prevent constipation. Keep the hind quarters of the animal at an elevated level and to provide treatment at the occurrence of the first symptom. The prolapsed mass should be kept clean and protected for contamination.

## REPEAT BREEDING

Repeat breeder is a cow/buffalo that has normal or near normal oestrous cycles and oestrus periods and has been bred 3 or more times to a fertile bull or with fertile semen yet, failed to conceive. Repeat breeding can be due to :

1. Congenital or genetic anatomical defects of genital tract. This includes segmental aplasia of uterus, cervix and vagina which cause failure of fertilization and if this condition is bilateral, the animal is sterile. These are diagnosed by careful vaginal and rectal examination.
2. Genetic, congenital or acquired defects of the ova, spermatozoa or early zygote—These result in failure of fertilization or early embryonic death and are not easy to diagnose.



3. Infectious or Traumatic inflammatory processes affecting the genital organs : These result in early embryonic deaths but, if the inflammation of the tract is severe then it leads to failure of fertilization.
4. Endocrine disfunction : This includes cystic ovarian degeneration and delayed ovulation. These are diagnosed by repeated rectal examinations.
5. Managerial deficiencies including nutritional : These are very common causes of repeat breeding. Managerial causes have become greatly increased due to the wide-spread use of artificial insemination. If the herd is large, then incidence of infertility is great. In large herds supervision is more difficult. For better results more time must be spent in estrus observation and more detailed records should be maintained. A common cause of repeat breeding is poor or inadequate observation of the cow for signs of estrus. If this is not done regularly, 2-4 times a day, estrous periods may be missed and poor timing of insemination in relation to ovulation may result in aging of either ova or spermatozoa or both which result in fertilization failure. So, if the animal is observed in heat during morning then inseminate or breed it during evening and if observed during evening then breed during morning.

Similarly if the ration fed to the animal is not balanced, it may lead to infertility. High ambient temperature also leads to early embryonic death. Critical period in this regard is few days immediately after insemination and around the time of implantation. Thus, exposure of the animal to high ambient temperature should be avoided.

Another major cause of repeat breeding in buffaloes in villages is availability of insufficient number of buffalo bulls for large buffalo population. The problem is further magnified during the breeding season when many buffaloes come in heat at the same time but there is usually only one bull, which is unable to produce sufficient fertile semen as required to cover all these estrual females due to its limited sperm reserve. In natural service, the bull deposits its semen at the proper site, while in A. I. there are many possibilities for man to make the spermatozoa infertile, such as :

- (a) Improper extension, freezing and storing of fertile semen.



- (b) Improper thawing of frozen semen.
- (c) Insemination done too late after thawing.
- (d) Insemination technique is improper and semen deposited at wrong place (eg. uterus or vagina) and not in the middle or cranial portion of the cervix.
- (e) Liquid semen is to be used as early as possible as storage at refrigeration temperature results in lowering of conception rates, each day.

The following factors must be kept in mind for preventing repeat breeding :

- (a) Cow should be bred 60 days or later post partum for better fertility.
- (b) A lay man should not palpate the ovaries at the time of insemination for ovulation, as he may cause rupture of follicle which results in poor conception rate.
- (c) Owner must be well acquainted with the signs of heat.
- (d) Carefully observe and record the heats and services of the estrual animals.
- (e) If natural service is used then the bulls and their semen libido and serving ability must be carefully evaluated.
- (f) If A. I. is practised then careful examination of frozen or liquid semen should be undertaken before inseminating cows.
- (g) If repeat breeding is a herd problem then the semen or bull may be harbouring infectious venereal diseases, or improper observation, recording, breeding and management may be there.
- (h) Animal should be carefully examined by Veterinarian to rule out genetic, acquired or congenital defects and endocrine dysfunction.
- (i) Treatment of the repeat breeding cow should never be routine or empirical but the animals should be studied very carefully



and in great detail and the recommended therapy should be given based on knowledge concerning reproductive physiology with the use of highly fertile males and servicing at the proper time of estrum.

Recommended therapy for specific disorders resulting in repeat breeding is given below :

- (i) If it is due to cystic ovarian degeneration then give HCG/LH 3000 to 5000 I. U. I/V or I/M.
- (ii) In delayed ovulation give HCG 1500 I. U. I/M at the time of heat.
- (iii) If there is evidence of uterine infection, then it is always better to give treatment after sensitivity testing of the pathogens. If facilities for sensitivity testing are not available then Lugol's Iodine is the drug of choice-given in the concentration of 1:20 in 40 ml volume-intrauterine at the time of estrus or broad spectrum antibiotics like ampicillin, streptopencillin, nitrofurazones etc. @ 2-4 gm in 40 ml distilled water intra-uterine.

## RETENTION OF PLACENTA

- (1) Foetal membranes retained for longer than 12 hours post-partum are considered retained.
- (2) If untreated, leads to endometritis, metritis and pyometra with subsequent drop in fertility. Also results in drop in milk production, delayed uterine involution and rarely in septicaemia and death.
- (3) In most cases, placental retention should be considered as a clinical symptom of a more generalised disease eg. infections, metabolic diseases, nutritional deficiencies, allergies or other disorders.
- (4) Incidence is quite high in abnormal deliveries eg. twinning, caesarean section, fetotomy and other serious dystokias, abortion, premature births and brucellosis. Where enzootic outbreak of retained placenta is observed, presence of some enzootic infection or nutritional deficiencies must be considered.



- (5) Uterine atony without any disturbance of the detachment process is considered to be the cause of 1-2% of all cases of retained placenta. Slight pulling on the membranes will detach the placenta.
- (6) Prophylaxis include biological-rich limited nutrition for pregnant animals, daily out-door movement, avoidance of transport in advance pregnancy, sufficiently extended dry period (6-8 weeks), avoidance of bacterial infection and parturition hygiene. In addition, 2 million units of Vit. A Inj. should be given 4-8 weeks antepartum.
- (7) Although practised by many Vets. upon client demand, manual removal is slowly beginning to be discouraged with the advent of new research, more enlightened practitioners and the education of dairymen. The complications associated with this practice are metritis, septicemia, toxemia, uterine abcess, peri-metritis and other attendant complications such as delayed involution and conception.

Manual removal should be practised only when the entire placenta is free and only hindered in its expulsion by a partially closed cervix or lack of uterine contractions.

- (8) When associated with uterine atony due to hypocalcemia, placental retention has been shown to respond to oxytocin @ 30-50 units S/C or I/M at intervals of 2 hours (X4) in conjunction with therapeutic doses of calcium borogluconate.
- (9) Oxytocin is of little benefit after 24-48 hours postpartum.
- (10) Ergonovine at a dose rate of 1 to 5 mg has been made for a more lasting oxytotic effect and appears to be much more beneficial than oxytocin in case of diseased or atonic myometrial tissue.
- (11) Estrogens increase uterine tone, myometrial activity and uterine circulation, thereby making the uterus more resistant to infection (in the doses of 1-4 mg three to four times) but excessive doses could cause reduced fertility subsequently.
- (12) Intrauterine instillation of antibiotics and antimicrobials is quite popular and results in higher subsequent fertility than manual removal. 500 ml of a 2 to 4 per cent Lugol's Iodine



solution every 2-3 days until the placenta drops has been shown to be an effective antimicrobial agent. Broad spectrum tetracyclines and sulfonamides give encouraging results when administered every other day upto one treatment after placenta drops. Cleanliness and aseptic precautions must be observed for local administrations in retained placenta cases.

## ESTRUS DETECTION ON FARMS

After the introduction of A. I. in livestock, the responsibility of oestrus detection and insemination at appropriate time has switched over from bull to the stockman. Improper estrus detection leads to tremendous economic losses by increasing the inter-calving period and the animals are blamed for slackness on the part of stockman. Effective oestrus detection is key to maximizing reproductive efficiency. Upon physical examination of genitalia of breedable cows/buffaloes, it is found that many of those which are pronounced acyclic are in fact regularly cycling but escape the observation of stockman.

### Problems in Estrus Detection

1. Missed or unobserved oestrus
2. Estrus detection errors

### Unobserved Estrus

In well-fed herds, 90% animals resume cycling within 50-60 days postpartum. Anestrus pronounced cases should not be overlooked as acyclic unless examined per rectally twice at 10 days intervals and ovaries are found static. At the same time, in open herds some animals are found pregnant upon such examination. Estrus detection becomes difficult by two factors: (i) human factors and (ii) animal factors.

Human factors include insufficient time devoted for daily estrus detection, preoccupation with other chores during detection hours, ignorance of heat marks, poor records.

Animal is blamed for being in heat for shorter periods and that too during night hours, low levels of estrus activity, mounting



periods are very short and few, problems in legs or slippery floor etc.

### **Oestrus Detection Errors**

Some times stockmen mark those cows which are not actually in oestrus or are near heat or which are pregnant. This happens when stockman relies more upon secondary signs (Vaginal mucous, vocalisation etc.) and oestrus detection aids rather than "standing oestrus". This mistake is characterized by shorter period between inseminations, pregnant cows presented for A. I., non-cyclic or luteal phase animals brought for insemination etc. These must be avoided to prevent abortions and wastage of time, semen and money. Identification of animals should be proper.

### **Oestrus Detection Aids**

1. Wall charts and individual cow records.
2. Secondary signs of oestrus.
3. Palpation of reproductive organs.
4. Heat detector animals : chin-ball markers, surgically prepared bulls, hormone treated cows, cystic cows.
5. Prostaglandins.

### **Role of X-ray in the Services of Farmers and Veterinarians**

Proper diagnosis of disease is most important for its treatment. Radiographs provide considerable information to confirm the diagnosis in number of diseases. Radiographic examination of thorax is extremely important in diagnosis of lung and heart diseases. Its value is equally great in locating the foreign bodies. The diseases of the mediastinum and normal relationship of heart and diaphragm can be clearly visualised in chest X-ray. The reticular hernia, where a part of the reticulum herniates into the chest cavity, mostly due to damage caused by sharp foreign bodies, can also be diagnosed. The other chest diseases like pneumonia, lung oedema, tuberculosis, pneumothorax, lung abscess and cyst etc. can also be diagnosed by chest X-rays.

Our cattle ingest a lot of metallic foreign bodies with their food as they are not selective feeders. X-rays help in locating the



foreign bodies. Lateral radiographs in such cases will show metallic objects in the reticulum.

The fractures and dislocations of various bones can be diagnosed by X-rays. The healing process of the bones can also be studied by X-rays. The diseases of the brain in small and large animal like brain tumor, cyst, abscess and inflammation of the covering membranes of brain can also be diagnosed. Similarly, the diseases of the kidneys, ureters and bladder, for example, calculi (stones) can be diagnosed with the help of 'X-rays' and so special procedures are adopted by injecting radiopaque material into the blood stream or directly into these organs to visualise them. This is known as 'Contrast Radiography' and can be done both in large and small animals.

The X-rays reveal the inner body structures and help in diagnosing a disease which may not be possible otherwise. Therefore, the precious milch and working animals of the farmer can be saved from various type of the affections with early proper diagnosis.

## MANAGEMENT OF SURGICAL CONDITIONS

### (A) Traumatic Reticulitis and Diaphragmatic Hernia

Diaphragmatic hernia is an internal hernia where abdominal viscera pass into the chest cavity through an acquired rupture or congenital aperture in the diaphragm. Commonly, in cattle and buffaloes, the reticulum herniates into the thoracic cavity (reticular hernia or reticular eventration). Other organs like omasum, abomasum, some loops of small intestine, spleen and liver have also been reported to herniate alongwith the reticulum, but without any additional symptoms.

Diaphragmatic hernia is more common in buffaloes. It is of great concern and significance along all the traumatic diseases and ranks second in order of occurrence.

Adult female buffaloes (5-9 years) are more frequently affected as compared to the young heifers and older buffaloes.

The onset of the diaphragmatic hernia goes undetected at farmer's place. By the time the animal is referred to the clinics, the



disease is in advanced stage and beyond the scope of any conservative treatment.

Since the disease affects lactating buffaloes in their prime, it causes losses to the farmer. The occurrence of the disease is generally associated with the presence of sharp foreign bodies in the reticulum, as confirmed by X-ray examination or on exploratory rumenotomy. These may be found embedded either in the reticular wall (leading to traumatic reticulitis) or in the diaphragm or pericardium or fibrous tract. Chronic and repeated trauma caused by sharp foreign bodies, weakness of diaphragm and physical forces like increased tension over the diaphragm due to straining at the time of parturition, may be considered responsible for the disease.

The affected animal exhibits one or more of the symptoms like progressive emaciation, weakness and dehydration. Tympany refractory to the treatment, anorexia of various degrees are also observed. Affected animals may show intermittent constipation or diarrhoea. There is drop in milk yield, brisket oedema, with history of calving. Chronic recurrent tympany is pathognomic.

Clinical diagnosis is based on history and characteristic symptoms like recurrent tympany, physical examination, radiographic examination, exploratory laparotomy or rumenotomy.

The only solution to the problem is to undertake the repair of the diaphragmatic defect at the earliest, through surgical intervention. The affected animal, if untreated, usually dies within a period of 6-8 weeks from the onset of symptoms. The farmer thus undergoes a double economic loss, firstly through maintenance of unproductive animal till it survives and secondly by the loss of the highly priced animal. In addition, the young calf which is denied of the mother's milk usually dies or if survives remains unthrifty throughout the life.

Surgical intervention needs two stage surgery. Firstly a lapro-rumenotomy is performed and secondly after a lapse of 48 hours herniorrhaphy is undertaken.

Lapro-rumenotomy is performed under para-vertebral block and local infiltration analgesia. Frothy contents and foreign bodies are taken out. Following rumenotomy, the animal is maintained on intravenous fluid therapy without access to feed and



water. Hernial repair is done either through transabdominal or transthoracic approach. The animal is paid attention for 15-20 post-operative days.

In terms of costs and benefits analysis, the operation has rewarding results.

Prevention involves :

- (i) Passage of feed through magnetic channels to remove metallic foreign bodies.
- (ii) Preventing access of sharp foreign bodies like nails etc. to the animal in the feeds.

## **(B) Surgical Conditions of New Born Calves**

On many occasions, it has been observed that young calves born with certain congenital anomalies. These anomalies mostly affect the limbs, navel area, anal area and eyes.

### **(a) Anomalies of the limbs**

- (i) **Polymelia** : It is a condition where an extra limb is present on the body either affecting some special organ or on the sides of the body. This condition is mostly observed in cow calves. These supernumerary appendages are reported at the site of anal opening, on the side of scapula and on dewlap then it can be removed easily under mild sedation and local analgesia but when it is present at the site of anal opening then it will block the passage of faeces also. Therefore, its immediate removal and creation of new anal opening is required. To locate the site of attachment of the limb, radiograph is taken. Prognosis of surgery will depend on the duration of the surgery and condition of the affected organ.
- (ii) **Polydactyly** : This condition refers to the duplication of the digit/digits and is mostly seen in foals. These extra digits are fully developed and mostly located at the fetlock joint. Radiograph of the involved limb is taken to know the origin of the extra digit. Although the additional digit does not interfere much with the movement



of the animal but affects the vice of the foals. The animals are generally operated under general anaesthesia and care is taken to avoid the damage to the joint capsule. After excision of the digit a supportive pressure bandage is applied.

- (iii) **Ankylosed joint :** Sometimes the calves are born with immovable stiff and fixed joints and the calf will have difficulties while walking. This condition is known as ankylosed joint. When the calf is presented with such a condition then radiograph of the affected joint is taken which will reveal partial or complete fusion of the bones. If there is a partial fusion of the bone, then daily massage with counter-irritants and exercise will reduce the stiffness but when bones are completely fused then it cannot be treated. This anomaly mostly affects the carpal joint.
- (iv) **Knuckling :** It is a congenital condition where the limb of the calf gets bent either at carpal joint or at fetlock joint. This condition is mostly seen in young foals, cow calves and buffalo calves and affects most of time fore-limb only. If this condition is not corrected at proper time then skin over the joint will get broken due to constant rubbing resulting in arthritis. If the bending of limb is partial, then it can be straightened forcibly and a support of aluminium splint is given followed by application of light plaster cast for ten or fifteen days. If it cannot be corrected manually then under local analgesia and mild sedation, the contracted tendons are identified and cut to make it straight and supported by application of plaster cast.

**(b) Anomalies of the navel area**

- (i) **Omphalitis and navel abscess :** After parturition of the animal, the foetal membranes attached to the navel area of the foetus should be cut aseptically and a medicine known as Tincture iodine is painted over the affected area and that area is covered with clean clothes. If these precautions are not taken then navel area get infected by dust, urine and faeces and pathogenic organisms will get entry into it resulting in swelling of the involved area. The navel portion will be red in colour and painful to touch. This condition is known as omphalitis. If this



condition is not treated well in time then it will further increase in size giving an appearance of big swelling which will be hard in the beginning and soft in later stages. If this soft swelling is pricked with a needle then pus will come out. This condition is called *navel abscess*. When the navel abscess is immature, that is hard to touch then it is converted into mature one by counter-irritant massage and hot fomentations. After maturing it, the pus is drained out by incising it and a tincture iodine plug is inserted till it gets healed.

- (ii) **Umbilical hernia :** In new born calves sometimes a soft swelling over the navel region is observed which can be pressed easily back into the body cavity. After pushing back, a round hole like structure can be felt which is known as *hernial ring* and in that soft swelling a loop of intestine get entangled. Such swelling of the skin having loop of intestine in it is called *hernial sac* and the condition is known as *Hernia*. The hernias should be repaired as early as possible because any mechanical trauma may cause widening of the *hernial ring* resulting in increase in size of soft swelling. When the entangled loop of intestine gets adhered to the skin then it will impair the digestion also. For treatment of this type of soft swelling in young and milk suckling calves a small and appropriate sized wooden board is placed to reduce it back into the body and held in position by a tight bandage for at least 15-20 days. In due course of time the *hernial ring* will get sealed off but this type of treatment is not a perfect method of treatment. The best way is surgical repair of *hernial ring* under local infiltration analgesia. The calf is maintained on mustard oil and laxative diet for at least seven days.
- (iii) **Patent urachus :** This condition is mostly seen in both calves and foals. The clinical signs noted are intermittent dribbling of urine from the umbilicus area and the hair of the umbilicus will remain wet with urine. If this condition persists for sometime, retrograde infection generally results in infection of the umbilical area, abscess formation, peritonitis and cystitis etc. In majority of cases conservative treatment is successful. So repeated cauterization of urachus with 90% phenol is very success-



ful. In those animals in which cauterization is not successful, radical surgery is indicated under light general anesthesia or dorsal recumbency.

(c) **Anomalies of anal area**

- (i) **Atresia ani** : This condition is commonly seen in kids, cow calves, buffalo calves and piglets. The calf will try to pass the faeces at repeated intervals of time but cannot do so. The abdomen will be distended bilaterally due to accumulation of gases. The calf will keep on crying repeatedly. On examination, there will be absence of anal opening. If this condition is not corrected well in time, the pathogenic bacteria will multiply very rapidly in the retained muconium causing toxemia and death. The treatment is surgical only. To make the passage for faeces under epidural analgesia a circular incision is made at the site of anus and the blind end of the rectum is identified in the pelvic cavity and sutured with skin in a circular fashion. Sometimes the terminal portion of the alimentary canal i. e. rectum is also absent along with anus and the blind sac of G. I. tract is fixed in the abdominal cavity. This condition is called *atresia ani et. recti*. This is a very serious and difficult condition to manage and chances of survival are very less, unless corrective surgery is done immediately.
- (ii) **Recto-vaginal fistula** : It is condition of the female calves where there is a opening between the rectum and vagina and faeces will come out either through vagina only or through both openings anus and vagina leading to vaginitis. Recto-vaginal fistula is sometimes associated with atresia ani also so in such cases urine and drops of faeces will pass through vagina only. To treat such conditions first artificial opening for anus is prepared and afterward fistula is repaired. If the fistula opening is visible just near to dorsal commissure of vulvar lips then best approach is through vagina and the calves are maintained on lubricated and laxative diet including mustard oil and jaggery of wheat bran is given.
- (iii) **Recto-urethral fistula** : This condition is just like recto-vaginal fistula but seen in male calves only. This



condition is also sometimes associated with atresia ani. The most important clinical sign is coming of drops of faeces along with urine. The prognosis of such conditions is usually grave as compared to recto-vaginal fistula. For confirmation contrast radiography after barium enema is very helpful and fistula is repaired through rectum only after putting the calf on low epidural block. If anus is imperforated then perforation of the anus is undertaken before repair of fistular opening.

#### (d) **Anomalies of the eyes**

- (i) **Symblepharaon :** This is a condition where new born pups are unable to open the eye lids after birth upto a longer period. In pups, this condition is considered to be normal upto five days but if still they are not in a position to open the eyelids then there are chances of adhesions either with cornea or with eye-lids itself. Therefore, after blocking the eye lids and cornea with auriculo-palpal and patterson block, the eye lids are separated from each other and from cornea. The ophthalmic eye drops/ointment are instilled into the eye till the eye lids get their mobility.
- (ii) **Symblepharon and strabismus :** Symblepharon means union of eyelids whereas strabismus stands for union and fixation of cornea in deviated position, with surrounding structures. These conditions are both congenital and may affect the young calves simultaneously. Such types of conditions are incurable.

#### (C) **Retention of Urine in Bullocks**

Retention of urine is characterized by unsuccessful efforts to urinate, distension of bladder and finally the rupture of urethra or rupture of urinary bladder.

Retention of urine is caused by many aetiological factors viz., urethritis, foreign body in urethra, some growth in the vicinity of urethra and urethral and cystic calculi. The urethral calculus is the major cause of retention of urine especially in castrated bullocks.

**Causes :** The formation of urinary calculi occurs when urinary solutes are precipitated out of solution. However, because



the precipitation occurs slowly and over a long period, there is a common physical tendency for precipitation to occur around a nidus resulting in formation of calculi. Various factors such as infection, nidus formation, urinary stasis, change in urinary pH, hypervitaminosis D, nature of diet, limited water consumption, deficiency of vitamin A, etc. have been implicated in causing the uroliths.

**Symptoms :** Abdominal pain with kicking at belly, repeated twitching of the penis, sternuous efforts to urinate accompanied by straining, grinding and grunting of teeth are common signs. In protracted cases, the animals will become off feed, dull, depressed and become recumbent in the terminal stage.

**Treatment :** Rectal examination will reveal whether the bladder is distended or empty (if ruptured). Urine will also come out through needle in abdominal cavity in cases of seepage of urine from urinary bladder with distended or rupture of bladder.

Before casting the animal, bladder should be half empty otherwise rupture may result. This is done by passing a rubber tubing with a 13 gauge needle in urinary bladder through rectum.

Diuretics must not be given in such cases with retained urine otherwise, it will result in rupture of bladder.

Post-scrotal urethrotomy is done. In most of cases, calculus is lodged at sigmoid flexure region of penis. If stone is not traced here, then subischial or ischial urethrotomy may be done. After removing the calculi, the whole length of urethra should be catheterized and sutured and the catheter should be transfixed with prepuce to avoid its dislodgement. In cases of ruptured bladder, it should be repaired through left flank region.

**Post-operative management :** Broad spectrum antibiotics especially should be given for 7 days. Hexamine 4 gm orally twice a day for 5 days may be given as urinary antiseptic. Before giving hexamine, sodium acid phosphate or ammonium chloride 30 gm should be given. In dehydrated cases fluid should be given. In bladder atony, neostigmine @ 4 mg sub-cutaneously four times a day for 2-3 days is helpful. To counter metabolic alkalosis in such cases dilute hydrochloric acid 5% @ 100 ml/day for 5 days is given orally.



Prognosis of disease is grave if there is rupture of bladder or seepage of urine through bladder wall.

### Prevention

- (i) Adlib water particularly in summer season should be given.
- (ii) Addition of salt or calcium carbonate at the level of 4% of the total ration and adequate level of vitamin A helps in controlling the formation of calculi.

### (D) Intestinal Obstruction

Intestinal obstruction includes volvulus, intussusception and strangulation.

**Symptoms :** Anorexia

Depression

Dehydration

Kicking on the belly, due to pain animal lies down and gets up, loss of body weight.

Animal will not pass faeces, only blood mixed mucous is passed.

May be distension of abdomen. Increased pulse and respiration. On rectal examination, gas filled loops of small intestine might be felt.

**Treatment :** Surgical correction is the only treatment of choice.

**Management :**

1. Give fluid therapy (Dextrose saline).
2. Only liquid food is to be offered to the animal upto 10 days after surgery.
3. Then give semisolid food for about one month.
4. Don't give exercise after offering feed to the animal.

**Points to be considered :**

1. Deworming of animal should be done regularly.



2. Don't give exercise after giving food to the animal.
3. Don't offer too cold water to the animals.
4. If intestinal obstruction is suspected strong purgatives should not be used. This will lead to rupture of intestine.

**Prognosis** : If treatment is delayed prognosis is guarded.

### **(E) Surgical Conditions of Udder and Teat, its Treatment and Precautions**

Surgical conditions of the udder and teat are getting much attention now a days as they affect the economic value of the farmers. For convenience sake, these conditions can be divided into four main-sub-groups : conditions of epithelial surface, teat canal, teat sphincter and physiological variations.

#### **(a) Conditions of the epithelial surface of the teat**

- (i) **Supernumerary teats (extra teats)** : These teats are oftenly seen in bovine on the posterior surface of the udder and in between the teats. Their functional property can be determined only after parturition of the animal but it is desirable to remove these teats for cosmetic reason and because they interfere with milking procedure. The most desirable time to remove these teats when heifers are young. They are removed surgically by making two elliptical incisions after local analgesia and the surgical wound is closed by interrupted sutures using silk as suturing material.
- (ii) **Teat wounds, injuries and cracks (Sore teat)** : The teats are more prone to injuries because of their ventral anatomical position and hanging property. An injured teat with wounds/cracks will cause pain while milking and during suckling by the calf and sometimes there will be bleeding from these injuries which can mix with the milk making it unfit for drinking and the animal will not allow to take whole milk out. When the animal is in milking phase then treatment of these injuries will take longer period as compared to dry



period. To treat such teats first thing is to do milking with dry hand, do not let the calf to suckle that teat, never pull the teat while milking and practice full hand milking. Such type of injuries are first washed with light potassium permagnate solution then dry it and apply soothing antiseptic creams like zinc ointment, propamidine M & B antiseptic cream, Betnovate-N or Glycerine iodine paint.

- (iii) **Udder and teat abscess:** The incidence of the udder abscess is more as compared to teat abscess and is mostly seen in lactating cows. Whenever there is an infection of the udder specially due to resistant organisms then in chronic cases, suddenly a swelling becomes visible on the sides of udder which after maturing get ruptured and pus will start oozing from it. Other causes of the abscesses formation are deep penetrating injuries, lesions on the udder and teat etc. The pouch of the abscess is flushed with light potassium permagnate solution and dressed with B.I.P.P. and betadine solutions which will give satisfactory result.
- (iv) **Lesions of the udder and teat:** Udder and teats are sometimes affected secondarily in certain conditions e.g. *Foot and mouth* disease and primarily in *pox disease*. During these diseases there will be large number of lesions of various diameters on both udder and teat. These lesions will result in painful milking and predispose it to mastitis, etc. Therefore, these lesions are first well irrigated with mild potassium permagnate solutions and dried; thereafter soothing antiseptic creams like zinc ointment, betnovate-N cream or glycerine iodine paint are used to cure these external lesions. The animals are milked with dry, soft and full hand.
- (v) **Quarter and teat necrosis:** Necrosis of the teat is mostly seen in buffaloes just after parturition. The most probable case can be latent infection during dry phase of lactation which becomes evident soon after parturition. At first, there will be inflammation of the



teat followed by fibrous cord formation and afterward skin of the teat will get necrosed and sloughed off. Such quarter will usually get fibrosed or they have to be blocked by acriflavin or tincture iodine solutions. In mild cases, slight fibrous cord of the teat is observed but milking of the teat can be done. In moderate cases, milk production will be there but due to fibrosis of the whole teat canal milk cannot be taken out. So, milk has to be taken by teat siphon, etc. In advanced cases of latent infection of dry lactation the entire quarter will get fibrosed and skin of the teat after fibrosis will start sloughing off. However, after sloughing off the skin, zinc ointment is very helpful but in most of the cases, such quarters will get fibrosed itself or they have to be blocked due to constant leaking of the milk.

*Quarter necrosis* is a very common sequele to the mastitis in goats. In chronic case of mastitis, necrosis of the quarter usually results. So, *amputation of the affected* quarter is done.

- (vi) **Teat fistula** : This condition is mostly observed in those animals which have long teats and hanging udder specially in goats. When they try to jump over the barbed wire, their teat get torn and milk will flow through that torn portion. Such type of lacerated teat should be sutured immediately because if infection will gain entry, then it will cause mastitis or gangrene of the teat depending upon the type of organisms. Therefore, at once infuse medicines like pendistrin- SH etc. and consult veterinary doctor for suturing of the torn skin and muscles. During suturing, a sterilised catheter is placed inside the teat and muscles and skin are sutured followed by intra-mammary infusion which should be continued till removal of the teat catheter. On 10th day of repair of the teat, skin sutures and teat catheter are removed.
- (vii) **Teat papillomas (warts)** : These are finger like projections mostly observed in young cows. They may be isolated or multiple and are usually in the form of groups giving a cauliflower like appearance. Warts



may be present on the teat without causing any trouble during milking, but if they are ulcerated or cracked they are very painful on pressing. These growths are generally treated by ligature, by hot iron, by potential caustics, by wart enucleator and by excision with knife. For malignant tumours use of caustics, radio therapy and excision is recommended.

**(b) Conditions of the teat canal**

- (i) Lactolith (milk stone) :** Sometimes minerals get deposited in the teat canal to form a stone like structure. This stone moves freely in the teat canal and can hinder the milk flow if it is large in size. If the teat is examined externally and felt along its length then it can be palpated in the form of a round moveable structure. If these stones are small in size, they can be easily washed out along with milk. If it is large in size, they are usually crushed with small forceps and milked out.
- (ii) Teat canal polyps (growth in the teat canal) :** They are small pea-sized growths attached to the wall of teat canal. Polyps may interfere with milk flow and can be palpated by careful examination of the teat, especially after the milking. These growths can be easily taken out by tumour extractor. Intra-mammary antibiotics are infused and a teat catheter is placed.
- (iii) Teat spider (blind quarter) :** This condition is usually due to congenital absence of teat cistern or teat canal. It can be acquired in cases of injury, tumour and inflammation of mammary fissure resulting in formation of a thin or thick membrane in teat canal. Milking is not possible from the affected quarter. The obstruction may be high at the base of teat or external lower down in the canal. The teat bistury (Hudson spiral teat instrument) is inserted into teat canal and membrane is penetrated. The instrument is given three or four revolutions for deep penetration and suddenly withdrawn. Regular milking will keep the teat cistern patent.



(iv) **Fibrosis of teat canal** : This condition has been commonly seen in most of the lactating animals. Where a hard fibrous cord like structure is observed in the teat, exact cause of this condition is not clear, however, mechanical and repeated traumas due to thumb milking, calf suckling, etc. are main contributory factors. Sometimes mastitis can also result into fibrosis of quarter and teat canal. Due to formation of this fibrous cord, the milk will come in fine stream and in less quantity. Sometimes this fibrous cord can also block the whole teat canal resulting in complete stoppage of milk out flow although milk secretion is normal. This cord either start from the base of teat then gradually it will cover the whole teat canal and secreted milk will not come out of teat. Only use of sterilised teat siphon can take the milk out. If it starts from the tip of teat then chances of treatment are favourable and obstructing fibrous mass can be taken out by using Hug's tumour extractor. Hot water fomentation for at least 10-15 minutes followed by Iodine ointment massage or Himax massage is very helpful. Although complete treatment of this condition is not possible but in early stages and the cord involving tip of teat can give encouraging results.

(v) **Tumours of mammary gland** : Tumours of the mammary gland are frequent in lactating animals. However, lipomas and fibro-adenomas have been seen in buffalo heifers. These growths are removed surgically under local infiltration and epidural analgesia. The milk started coming from those cases where tumours were located either subcutaneously or partially involving the mammary gland. The mammary tumours are mostly seen in bitches. These tumours can be excised surgically, although the operation wound may be extensive.

#### (c) **Conditions of the teat sphincter**

(i) **Teat stenosis (hard milker)** : It is a condition where tip of the teat becomes tightened due to mechanical traumas, etc. resulting in hard milking of the teat. During milking one has to apply much force to take the



milk out and milk will come out in fine stream. This type of tightening of tip of teat is opened by a special instrument known as Hug's tumour extractor. After opening the hard tip of teat, the medicines which can prevent the diseases of the udder like Pendistrin-SH etc. can be given and a sterilized teat catheter is placed. Such type of teats should never be opened by cutting the tip of teat using safety razor etc. because sometimes whole sphincter of the teat can be incised making the teat leaky. While handling the teat it must be properly washed and cleaned with potassium permagnate solution and tip of the teat must be disinfected with spirit and every teat instrument and catheter should be sterilized. Hands must be properly washed and disinfected.

**Teat Leakers (free milker) :** This condition is just reverse to the teat stenosis/hard milker. From such teats, the milk will go on leaking due to injury and relaxation of teat sphincter and sometime infection may gain entry leading to mastitis. To tighten such tip of teat again, tincture iodine solution 1-2 ml is deposited in a circular fashion.

- (iii) **Blind teat (occlusion of teat orifice) :** The condition can be congenital or acquired. Whenever there is a mechanical trauma at or near the orifice that results in healing with occlusion of teat orifice. In congenital cases there is no opening in the teat for milk out flow. To open these type of teat orifices, the tip of the teat is prepared for surgery and a 15-gauge hypodermic needle is inserted till milk flows out, subsequently the needle is withdrawn and teat orifice is enlarged as in hard milker.

**(d) Conditions due to physiological changes**

- (i) This condition is observed after parturition and affects one or more teats. The glandular tissue and teat will be normal, there will not be any history of mastitis but there will be no secretion of the milk. The secretory cells will be physiologically inactive. Injections of oxytocin (Post pituitary) are given for let down of milk but only small quantity of milk will come



out and sometimes the milk can let down even in coming parturition without any treatment.

- (ii) **Blood in milk :** The presence of blood in milk is mostly seen in those cows which are heavy milkers and near the parturition or they have just parturated. The common cause of this condition is any mechanical injury on the udder resulting in rupture of blood vessels. This condition is treated by injecting chromostat, calcium borogluconate, claudin, kapilin or by giving styplan tabs and formalin orally.

#### **(F) Fractures in Large Animals – Precaution and Treatment**

Fracture means a break in the continuity of a bone. Fracture of the bone causes swelling and pain in the area involved and failure of the animal to bear weight on the affected limb. Fractures can be confirmed by X-ray examination. Mostly the fractures occur due to trauma which may occur due to accident, faulty casting technique, stumbling while running or falling. While management of fractures in small animals is comparatively easier, many problems are faced for large animals. These animals which fail to stand of their own and/or remain lying down for a prolonged period usually do not respond to treatment. The chances of successful treatment in such cases are remote. Complications are also more if a wound exists on the site of fracture or if bone comes out of this wound.

Whenever an animal has fractured its bone, rest should be given with minimal movements of animal. The animal should be in a neat and clean place with thick layers of sand or hay or be kept at dry kacha place. The site of fracture should be temporarily immobilized by application of bamboo splints and a latha (thick cloth) bandage. When the animal has to be transported for treatment, the affected limb should be kept upper most. The diagnosis of a fracture is done with the aid of clinical signs, palpation and radiographic examination.

For treatment of fractures, two main methods are used :

- (i) External immobilization and (ii) Internal immobilization

For external immobilization, splints, crutches and plaster casts are used. For internal immobilization, intramedullary pins, nails or



bone plates are used. Bone grafts can be used if there is gross loss of the bone.

Splints, either made of bamboo or of aluminium material are suitable as a temporary relief or for immobilization of lower long bones like metatarsal and metacarpal bones in light weight animals. Other techniques where plaster casts need not be applied include application of special crutch for immobilization of long bones like tibia, radius, metacarpal and metatarsal bones in both light and heavy weight animals. Fractured ends should be aligned under deep sedation by traction and countertraction before application of a crutch.

For retention of plaster cast on a limb in large animals, various techniques are used. These include hanging pin cast for metacarpal and metatarsal and transfixation for tibia. In these techniques intramedullary pins are passed transversally through either upper segment of fractured bone (hanging pin cast) or through both segments (transfixation) to secure the plaster cast and aluminium splints in place for long intervals. In case a wound exists at the site of fracture, a window is created few days after plaster cast for dressing purposes.

Internal immobilization of a fracture requires major surgery. It may not be feasible to use these techniques under field conditions at this stage.

In large animals, healing of fracture requires about 2-3 months. Mild exercise and massage of the area and limb are advised to keep the muscular atrophy to the minimum. Muscular atrophy of the affected limb in case of long bone fractures is a sequelae to disease of limb and less weight bearing. Physiotherapeutic exercises after removal of cast or implants help to restore functional ability.

Early care and prompt treatment of fractures is a must in large animals. With delay, malunion or infection occurs and it becomes very difficult to treat the case.



# Vaccination schedule of important diseases of bovines (Cattle & Buffaloes)

Vaccine available from			
	I. V. R. I. **	Hoechst	BAIF Indian Immunologicals
(1) Foot & Mouth disease (F. M. D. vaccine)			
1st vaccination (Primary)	Twice, below one month of age with an interval of 21 days @ 5 ml S/C	At four weeks and below @ 10 ml S/C	At 6-8 weeks of age @ 10 ml S/C  At four months of age @ 3 ml S/C
2nd vaccination (Booster)	At 5-6 months of age @ 10 ml S/C	Within 3 months of primary vaccination @ 10 ml S/C	At 4 months of age and 6 months later @ 10 ml S/C  2 4 weeks after primary vaccination @ 3 ml S/C
Revaccinations	After every 6 months @ 10 ml S/C	After every 6 months @ 10 ml S/C	After every 6 months @ 3 ml S/C  12 monthly intervals @ 10 ml S/C



Vaccine	Dose & route	Remarks
(2) Haemorrhagic septicaemia (H.S.)	(i) H. S. alum precipitated vaccine*	Animals to be vaccinated before the onset of rainy season (May and June) or during outbreaks.
(3) Black quarter (B. Q.)	(ii) H. S. oil adjuvant vaccine*	During May-June or Oct.-Nov. and repeat every year.
(3) Black quarter (B. Q.)	B. Q. vaccine*	Before the onset of rainy season.
(4) Rinderpest (R. P.)	(i) F. D. G. T. V.*	For local cattle only. Not to be used in pregnant and exotic animals.
(ii) Tissue culture vaccine (from BAIF)	@ 1 ml S/C	Can be given to pregnant, exotic or cross-bred animals.
(5) Rabies	(1) Antirabies vaccine*	To be given only after dog or neola bites, who are suspected to be rabid (in post-bite cases).
Dose varies with species of animals and according to their body wt. as schedule given below.		



- (i) Animal weighing between 30-100 lbs. e.g. young calf, 5 ml S/C for 14 days.
- (ii) Animal above 100 lbs. body wt. e. g. growing calf, heifer etc. @ 10 ml S/C daily for 14 days.
- (iii) Animal like buffalo, cow, bullock, etc. @ 30 ml S/C daily for 14 days.
- (2) Rabies (HEP) Flury strain vaccine  
(From Bio-Med Pvt Ltd.) on 0 day (on the same day when animal was bitten) 1st injection @ 2 ml by intraspinal route and 2nd injection of 2 ml I/M. On



day 3 and 5, one  
injection each of  
2 ml/M.

\*Deputy Director, Haryana Veterinary Vaccine Institute, Hisar.

\*\*Head, Biological Products Division, Indian Veterinary Research Institute.

(i) Izatnagar, Bareilly (U. P.)-243 122.

(ii) M/s Hoechst India Ltd. (from Chemist).

(iii) M/s Bhartiya Agro-Industries Foundation (BAIF) Laboratories, Briahnagar, Off. Wagholi-412 267,  
Dist. Pune (from Chemist).

(iv) M/s Bio-Med. Pvt. Ltd., Ghaziabad (U. P.) (from Chemist).

(v) M/s Indian Immunologicals, N. D. D. B., Anand (Gujarat).



# MANAGEMENT PRACTICES FOR BUFFALOES

## Raising of Dairy Replacement Stock

It is a well known fact that the future productiveness of the progeny of a buffalo will depend upon the way it is reared. If the calf is properly fed and well managed during its early age it will mature early and the age at first calving will be reduced. Mortality among such properly managed buffalo calves is also very low. For raising good buffalo dairy replacement stock, proper attention in feeding should be given when it is still in its Dam's womb. The body wt. at birth plays an important role in the future performance of the animal. The livestock keepers can improve the quality of their buffalo replacement stock by adopting the following practices :

### A. Care of the calf just after Birth

1. As soon as the calf is born, allow the buffalo to lick her calf.
2. Remove the mucous membrane from the mouth and the nostrils of the calf.
3. Dry the calf immediately after birth with the help of a coarse cloth or a piece of gunny bag and remove the slimy membrane from the calf's body by rubbing briskly. It stimulates the blood circulation and the calf becomes active.
4. If the calf feels difficulty in normal breathing then help the calf by artificial breathing. This can be done by applying gentle pressure and jerk on the chest wall and alternatively extending and flexing the fore limbs.
5. The healthy calf normally gets up on its own and runs about within half an hour, if the calf is weak, help it to stand up. If the hooves are uneven in growth then make them smooth and levelled.
6. Disinfection of navel cords : With the help of sterilized scissors, cut the navel cord of the newly born calf about an

inch from the body and ligate it. Apply tincture Iodine solution on it to prevent any infection and inflammation of the navel.

7. Feeding of colostrum : The first milk after calving is called colostrum which is a vital food for early immunity to the newly born calf. Ensure that the newly born calf should receive the colostrum just within half to 2 hours of birth.

The sooner a calf gets the colostrum, the better it can fight off infection and provide resistance to it. The first few hours after birth is only one time in the life of a calf when it can absorb the whole intact molecule of immunoglobulins through the small intestines as such without any degradation and give passive immunity against diseases. There is fall in the Ig concentration in the colostrum with the time after birth and also there is an exponential decline in the absorption of Ig with the age of the calf after birth. The calf should receive about 750 gm antibodies within 24 hrs of birth for complete immunity in first 3-4 suckling.

#### **Advantages of feeding colostrum**

- (i) The colostrum is a rich source of antibodies (immunoglobulins IgG) viz. IgM, IgG and IgA which provides early immunity.
- (ii) It provides vitality, vigour, stamina and resistance to diseases.
- (iii) It has high nutritive value, a low lactose content and an excellent source of Vit. A.
- (iv) It has also got a good laxative action which helps the calf in voiding the Tarry Faecal material (meconium) from the intestines.
- (v) Help the calf in suckling. Allow the calf for 15-20 minutes at each suckling twice a day.
- (vi) Wash the mouth of the calf and put a muzzle for some time after every milk feeding to prevent the habit of licking each other.



- (vii) If the weaning system is practised, feed the fresh milk at 40°C to the buffalo calves in a clean shallow milk bowl.
- (viii) If the calf is off feed, cut the next feed and give 30-50 ml of castor oil.
- (ix) If due to any reason the colostrum is not available to the newly born calves, the following mixture may be given :

Whip an egg in 250 ml of warm water. Add half to one spoonful of castor oil and 550 ml of warm whole milk. Supplement it with 10,000 IU of Vit. A and 80 mg of Auromycine. After properly stirring it, feed at 40°C (100°F). This mixture is sufficient for one time feeding and the calf should be fed thus thrice daily by preparing a fresh mixture for each feeding.

## **B. Care of the young calves**

- (i) Protect the newly born calves from inclement weather. The calf pens should be clean, dry, well ventilated and comfortable. The damp, dirty pens are liable to produce calf scour and pneumonia.
- (ii) Provide plenty of dry, soft bedding material in calf pens. Remove the soiled/wet portion of the bedding material daily and replace it with fresh clean and dry material.
- (iii) Protect the young calves from being injured or butted by adult animals.
- (iv) Keep the place clean, dry and disinfect it regularly.
- (v) Give regular exercise to the calves by allowing them to move about for some time daily. Groom the calves regularly.
- (vi) Keep the calves in individual in the calf pens to prevent them from licking each other to swallow dirt and from ingesting any infection.
- (vii) Deworming should be practised at 7-10 days of age. Repeat it regularly at 20 days interval upto one year of age with the help of piperazine adipate, etc.

- (viii) Treat the calves against external parasites like lice, ticks and mange regularly by spraying with 0.3 to 0.4% solution of malathion/summethion or lindane etc.
- (ix) For the control and treatment of calf scour, diarrhoea and dysentery the calves should be given ad orally Strinacin, Nef-tin or Sulphaguanadine 1/2-1 tablet for at least three consecutive days.
- (x) For proper identification of the calves the tattooing should be done at 5-7 days of age. This helps in the maintenance of proper records on the dairy farm.
- (xi) Rear female calves separately from male calves. The calves of the same age and body weight should be housed together.
- (xii) For proper record of growth rate of calves, the body weight should be taken at fortnightly/monthly intervals upto 6 months and at 9, 12, 15, 18 and 24 months.
- (xiii) Good quality, well cured and leafy hay should be offered from third week.
- (xiv) Provide salt licks in the mangers of the calf pen.
- (xv) The buffalo calves are generally heavier than cow calves of the same age. This fact should be taken into consideration. The feed is adjusted according to their body weight and not the age only.

### **C. Selection of buffalo heifers**

- (i) Select only those heifers which are well grown for their age.
- (ii) Select heifers that are born from bulls and dams which are well known for high milk production.
- (iii) The heifers should have dairy temperament and should be docile. It should have typical Murrah characters and free from any disqualification.
- (iv) The heifers should have good physical confirmation.
- (v) Select only those heifers having good physical confirmation and having no defects.



- (vi) If replacement is made through purchase, in that case always purchase pregnant heifers from a well established dairy farm of good reputation.

#### **D. Management of buffalo heifers**

- (i) The heifers should be handled gently and with great patience.
- (ii) The heifers should be provided regular exercise by allowing them to graze outside in the grazing areas.
- (iii) Treat the heifers against internal and external parasites at a regular interval (monthly/bimonthly/quarterly).
- (iv) Extra teats if any on the udder should get clipped by Veterinary Doctor before the age of six months.
- (v) Breed the heifers only when it attains proper body size and weight i.e. 275 to 300 kg body weight and 30 months of age.
- (vi) Rear heifers separately from young bulls.
- (vii) For proper identification the best method is hot iron branding at  $1\frac{1}{2}$  to 2 years of age.

#### **E. Care and management of dry pregnant buffaloes**

- (i) A buffalo should have atleast 60-90 days dry period (rest period) between two milking periods. Proper feeding at this stage will result in higher milk production in the subsequent lactation and will have no metabolic and reproductive troubles.
- (ii) Drying off buffalo : The buffalo must be properly dried off to avoid udder troubles later. The feeding of concentrate mixture should be stopped at least a week before starting the act of drying off. A special balanced ration should only be fed to reduce the milk flow. The buffalo should be milked once in a day for a while, then once on alternate day. Now, gradually lengthen the interval between milkings and finally milking should be stopped altogether. After complete drying off, teat dipping should be done in  $\text{KMnO}_4$  solution. Seal the teats by infusing the intra-mammary ointment viz., Floclox-D or Pendistrin-SH to keep the disease germs away

from entering into the udder and to avoid any incidence of mastitis.

- (iii) **Steaming up :** The proper feeding of buffaloes in the last quarter of pregnancy is called steaming up. It results in proper udder development and keeps the buffalo in the thrifty conditions at calving time. It increases the body reserve of nutrients for growing foetus. It will increase subsequent lactation length, increase butter fat, slightly avoid calving problems, minimise incidence of retained placenta and avoid deficiency and metabolic diseases.
- (iv) The ideal score for body condition at calving should be 2.5. It will avoid calving problem and helps in calving cases, increase milk yield, longer lactation period and prevents metabolic and deficiency diseases.
- (v) **Feeding before freshening :** For two weeks before the calving, the buffalo should be fed laxative and easily digestible feeds to keep her digestive system in a loose condition. Provide 2 to 2.5 kg concentrate per day alongwith good quality green fodder. Reduce the grains in the ration for atleast a week before freshening.
- (vi) Supplement concentrate mixture with good quality mineral mixture and keep salt bricks into the manger. There will be no problem of 'milk fever'. Minimize the incidence of retained placenta and other reproductive troubles.
- (vii) Maintain breeding records to know the expected date of calving. The average gestation period is about 310 days for buffaloes.
- (viii) Pregnant animal buffalo should be housed in a clean and comfortable house. Provide protection from unpleasant harsh weather conditions.
- (ix) Pregnant animals should not be put to draft work.
- (x) Vaccinations should not be done during the advanced stage of pregnancy.
- (xi) The buffalo should not be frightened or chased by dogs or children.



- (xii) Give palatable sufficient quantity of good quality green foliages alongwith legumes.
- (xiii) Avoid undue physical stress during late pregnancy.
- (xiv) Provide adequate clean and fresh drinking water.
- (xv) Regular cleaning and grooming should be done. Provide light exercise.
- (xvi) Transfer the pregnant buffaloes at least two weeks before calving to the calving pens. Provide soft bedding material in the pen. Ensure proper cleaning of the calving pen.

Symptoms of approaching parturition in a buffalo :

1. Appetite is diminished or lost completely.
2. Udder is distended.
3. Genital opening is congested and swollen.
4. Yellowish mucous discharge flows from the genital opening.
5. Depression near the pinbones appears.
6. The animal shows signs of restlessness by frequent waving of the tail, sitting, standing at short intervals and seeks separation.
7. Frequent urination occurs in small quantities.

#### **F. Care during calving**

1. In the normal position the fore legs of the calf comes out first with the head resting in between the two fore legs.
2. Do not unnecessarily interfere with the act of calving. Nature should be allowed to have its own course. If the cow has any difficulty, get the help of a Veterinary Surgeon or an expert herdsman.
3. Give the buffalo a warm dalia, mashed bran just before calving and after calving (Awati Gur Solution).
4. Allow the buffalo to lick the calf.

5. Let the calf get upon its own and run about. If it does not, help it to stand up. Healthy calf should be up in 20-30 minutes.
6. Wash the teats, udder fore and hind quarters with luke warm water containing some anti-septic and dry the cow immediately with dry clean cloth. Clean the udder of the buffalo thoroughly and after they are dry, allow the calf to suckle the teats.
7. Watch the expulsion of the after birth (placenta). Normally the placenta should be expelled within 5-6 hours. In case of difficulty, take the help of a Vety. Surgeon.
8. Protect the buffalo from unpleasant weather and put some coarse cloth or jute on the body of the buffalo in winter season.

#### **Care of the buffalo just after calving**

1. The buffalo should be provided luke warm water for drinking for atleast first three days after calving.
2. Provide laxative warm ration (Dalia) to the buffalo atleast for ten days so that there is complete expulsion of the placenta and after cleaning.
3. Wash the body, external genitalia and tail of the buffalo with warm water containing some antiseptic.
4. Provide well cured hay to the freshly calved buffalo.
5. The amount of the concentrate mixture should be gradually increased and reach full feeding in three weeks.
6. Transfer the buffalo from the maternity pen to milking barn five days after calving if she is normal. In case of any sickness the transfer would be delayed till she is recovered completely.
7. Provide challenge feeding to the freshly calved buffalo to exploit her maximum potentiality.
8. Ensure complete cleaning of the reproductive tract to reduce days opens.



## Signs of heat in a buffalo

- (i) Mucous discharge from vagina.
- (ii) There is a hyperoemia of vaginal mucous membrane.
- (iii) Bellowing.
- (iv) Excitement and restlessness.
- (v) Keeps the head upwards.
- (vi) Eyes appear red and the nictitating membrane becomes prominent.
- (vii) Peculiar movements of lumbo-sacral region and keep the tail raised on one side or the other side.
- (viii) Mounting behaviour.
- (ix) Frequent micturition in small quantities and sniffing of urine dropping site is a good indication of standing heat.
- (x) The buffalo in heat becomes frieny towards other buffaloes and shows interest in bull.
- (xi) Slightly off feed.
- (xii) Slight drop in milk yield and there is a peculiar phenomenon locally called as 'doka'. During 'doka' the teats become turgid as in let down condition but no milk comes out when actually milked.
- (xiii) Increase in the body temperature which can be easily felt while milking.

In addition to the above symptoms of heat exhibited by buffalo there are some measures which can be of great help to confirm the animal in 'heat' as given below :

1. Teaser bull prade during the cooler parts of the day i. e. between 5.00 A.M. to 6.00 A. M. and 7.00 P. M. to 8.00 P. M., for 30 minutes in summer and between 6.00 A.M. to 7.00 A.M. and 5.00 P.M. to 6.00 P. M. in winter.
2. Rectal examination of the reproductive organs by Veterinary Doctor.
3. Arbonization test by seeing the typical fernpattern of mucous discharge under microscope.

#### 4. Heat mount detectors.

**Effective heat detection programme needs the following :**

- (i) Upto date record system of each individual.
- (ii) Clear identification of buffaloes.
- (iii) Maintain oestrus expectancy chart (OEC) for each individual buffalo.
- (iv) Use of various heat detection aids.
- (v) Use of 'standing heat' as the primary criteria for insemination.
- (vi) Note the weight gain/loss trend. The buffalo will come in heat when they stop losing body weight especially in early lactation.
- (vii) Make a list of all animals that are to be bred within the next 21 days and closely watch the animals for heat symptoms with undivided attention.
- (viii) Assign the responsibility of heat detection to the best 'Buffalo' man on the farm.
- (ix) The farmer/person engaged for heat detection should know the symptoms of heat especially 'standing heat'.

#### **Care of Milch Buffaloes**

- 1. Never frighten or excite the milch buffaloes. Always handle them gently and with kindness.
- 2. House them comfortably and protect them from extreme weather conditions.
- 3. Observe regular hours of feeding and milking.
- 4. With proper feeding and care breed the buffalo between 80-90 days of calving.
- 5. Provide balanced feed alongwith good quality green fodder.
- 6. Provide plenty of mineral mixture.
- 7. To produce cheap and more milk, feed adequate quantity of mixed green fodder (legume and cereals) to the lactating buffaloes.



8. Always milk the animals with full hand method and practice complete milking.

### **Milking Management of Buffaloes**

Milking is also an 'Art'. The quantity and quality of milk produced greatly depends on the 'Art' of milking. Several methods are used for milking the animals, but the 'Full Hand' or Fisting method is the best practice. By this method the animal does not feel discomfort and irritation. Also more milk is drawn in less time and there is complete milking. Avoid knuckling method which is a wrong method of milking as it causes severe irritation, pain and injuries to the teats due to pressing it by knuckle of the milker's thumb. The milking should be completed within 7-8 minutes. Disinfect the udder and teats, before and after milking. For proper let down and clean milk production, the prior preparation of buffalo is a must. The buffalo should be milked quickly, quietly and efficiently. Avoid beating the animal.

### **Reproductive Management of Buffaloes**

The progress of a dairy farm depends upon the regular and efficient breeding of dairy animals. The ideal buffalo produces a calf after every 13-14 months. The improvement in overall reproduction can be achieved by getting some goals which are :

(i)	Service period	: 60-90 days
(ii)	Heat detection efficiency	: 90% or higher
(iii)	Service per conception	: Less than 2
(iv)	Conception rate	: 60 per cent or higher
(v)	Calving rate	: More than 75%
(vi)	Calving interval	: 13-14 months
(vii)	Lactation length	: 300 days
(viii)	Dry period	: 100-120 days
(ix)	Reproductive problems	: Less than 5 per cent
(x)	Animal health status	: Healthy herd, free from contagious diseases.

## **Proper Insemination of Buffaloes**

- (i) The best time of insemination is the 'standing' heat.
- (ii) If the buffalo shows the symptoms of heat in the evening, get it inseminated in the next morning and if shows the symptoms in the morning get it inseminated on the same day in the evening. Two inseminations in one heat have proved more useful.
- (iii) In case of heifers avoid first heat to make it more receptive. Generally the first heat also remains non-fertile.
- (iv) It has been observed that keeping the buffaloes body cool on the day of insemination by keeping it in good shade or by splashing cold water on the body helps in achieving good results.
- (v) The buffaloes should not be frightened or excited at the time of insemination.
- (vi) The best site for insemination is mid cervix and body of uterus in case of frozen semen.
- (vii) Ensure that the semen used is of good quality.

## **Summer Management of Buffaloes**

- (i) Keep the buffaloes in a loose house during summer which is airy, cool and comfortable or keep the animals under good shady trees and sprinkle water on the surroundings.
- (ii) Wash or splash water on the body of the buffaloes at least 3-4 times in a day especially during noon hours of the day in hot summer.
- (iii) Provide fresh and cold drinking water to the buffaloes at least four times in a day in summer.
- (iv) Supply green and succulent fodder to reduce the quantity of dry fodder to minimize the 'heat load'.
- (v) Regular supply of mineral mixture and common salt to animals.



- (vi) Protect buffaloes from intense solar heat. The buffaloes should be allowed to go for grazing either early in the morning before 10.00 A. M. or during late evening after 5.00 P. M. during hot summer months.

## FEEDING OF BUFFALOES

It has been observed that the feeding of adequate quantity of balanced ration alone can result in immediate increase of at least 30 to 40% in milk production of buffaloes. Thus, the buffaloes should be provided adequate balanced ration. Keeping in view of higher energy requirement of buffaloes, lactating buffalo ration should also be supplemented with good quality mineral mixture alongwith the common salt.

### Composition of Concentrate Mixtures

S. No.	Ingredients	Concentrate mixture-A	Concentrate mixture-B	Concentrate mixture-C
1.	Barley/Broken rice/Short wheat	40	20	30
2.	Wheat bran	50	—	30
3.	Rice bran	—	40	—
4.	Mustard cake	8	—	25
5.	Cotton seed cake	—	30	—
6.	Guar meal	—	8	13
7.	Mineral mixture	1	1	1
8.	Common salt	1	1	1
		100	100	100

### Feeding Schedule of Concentrate Mixture

1. Lactating buffaloes 1 kg concentrate mixture for 2.5 kg milk and 1 kg mixture extra for maintenance.
2. Pregnant buffaloes 2-2.5 kg concentrate mixture per head per day during last quarter of gestation.
3. Dry buffaloes & heifers 1 kg concentrate per head/day.

- |                    |                                  |
|--------------------|----------------------------------|
| 4. Young calves    | 0.5 kg concentrate per head/day. |
| 5. Bull & bullocks | 2-3 kg concentrate per head/day. |

### Tips for Feeding

- (i) The buffaloes should be fed palatable ration according to their nutrient requirement. Palatability of the roughage is of economic importance as the feed is digested more efficiently.
- (ii) There should be a variety of feed ingredients in the ration without increasing the cost.
- (iii) The ration must contain mixed green roughages having leguminous and cereal fodders. Feed mixed fodder to prevent the occurrence of bloat and indigestion.
- (iv) Adjust the amount of protein in the concentrate mixture according to the quality of green fodder fed to the buffaloes. If sufficient quantity of good quality leguminous fodder is available then the protein level in the concentrate mixture should be 10-11%, but if the green fodder is of poor quality having cereals only then the level should be 16-17%. When the fodder is of average quality, maintain protein level in the concentrate mixture around 13-14%.
- (v) Avoid abrupt change in the feeding schedule.
- (vi) Maintain regularity in feeding time. Avoid over feeding which may result in off feed condition (Anorexia).
- (vii) Grind the coarse grain to medium degree of particle size before being fed to the animals. This increases their digestibility.
- (viii) Long and thick stemmed fodder should be chopped before feeding.
- (ix) High moist and tender forage should be wilted or mixed with dry fodder before feeding.
- (x) Silage may be fed after milking as it imparts flavour to the milk.



- (xi) All feed must be stored properly in a dry place.
- (xii) Mouldy or otherwise damaged feed should not be fed.
- (xiii) In hot summer months provide minimum dry fodder and maximum succulant green roughages.
- (xiv) Make plenty of fresh water available to the buffaloes all the time.
- (xv) Provide adequate amount of salt and mineral mixture.

### Some Useful Practices

1. Feeding of cotton-seed cake in place of whole cotton seed.

There is a popular belief that the cotton seed when fed to buffaloes yields more quantity of fat rich milk than those feeding the cake. It has been observed that no significant difference has been noted in regard to the milk yield and fat production. Cotton seed cake is better in digestibility than cotton seed. It is evident that the cotton seed cake is more economical as compared to cotton seed for feeding dairy animals.

2. Silage making : The surplus green fodder should be preserved by making silage and should be fed to the animals in lean months and periods of green fodder scarcity. Suitable crops for silage : 1. Maize, 2. Oats, 3. Jowar, M. P. Chari etc.
3. Hay making : Good quality legume forages can be preserved by making hay during periods of surplus fodder production. The suitable crops for hay making are : Barseem, Lucerne etc.
4. Supply of green fodder to the animals throughout the year : For the production of cheap and more milk from dairy buffaloes the role of green fodder is very much important. Farmers can minimize the concentrate feeding and can get more yield at low cost.

## Fodder crops rotation

- (i) Sweet Sudan grass/Makchari (Teosinte) + Cowpea - Turnip barseem.
- (ii) M. P. Chari Cowpea (3 cuttings)—Barseem.
- (iii) Bajra + Guar—PP. grass—Japani Sarson—Oats.
- (iv) Maize + Cowpea—Japani Sarson—Barseem.
- (v) Hybrid Napier grass + Lucerne (herenial fodders)

Proper stage of harvesting of green fodders :

- (i) Barseem When 5-8% plants are in pre-flowering stage.
- (ii) Oats Dough stage.
- (iii) Cowpea When seed po. formation in 8-10% plants.
- (iv) Maize Milk stage.
- (v) Jowar/M. P. Chari/Makchari Dough stage.

## Housing of Buffaloes

The dairy buildings should be constructed with careful planning and designing. The buildings should be wisely located, properly oriented, constructed, spaced out and grouped. The selection of site and planning should receive special attention. The loose housing system is the best under our local climatic conditions. It is cheaper to construct and the animals also remain comfortable.

Floor space requirements for buffaloes (per head)

Category	Floor space requirements		Maximum No. of animals per head	Height of shed at eves
	Covered area m <sup>2</sup>	Open area m <sup>2</sup>		
Buffaloes	4.0	8.0	50	220 cm
Pregnant	12.0	12.0	1	-do-
Heifers	2.5	5.0	30	-do-
Young calves	1.0	2.0	20-25	individual having partition
Adult calves	2.0	4.0	20-25	



### Space requirements for feeding & water (per head cm)

	Length of Manger	Width of Manger	Depth of Manger	Height of Inner wall of Manger
1. Adult Buffaloes	60-75	60	40	50
2. Calves	40-50	40	15	20

## SELECTION OF MURRAH BULLS

The same general characteristics desired in dairy cows, are wanted in dairy bulls but greater emphasis is placed upon the production records and pedigrees of their ancestor. A bull is more than half of the herd. It must be selected very carefully.

### General Appearance

A dairy bull should be large attractive, show, masculinity, and have balance in type and conformation. He should have a long, clear cut masculine head with bright, prominent eyes and a large muzzle. The horn should be curved and properly placed.

He should have a straight top line, long body and long and level rump. The tail setting should be smooth. Width of body at the fore rib, loin hips, and pin bones is desired. In addition, the bull should possess the characteristics of the Murrah breed. The colour of skin and hairs should be jet black.

### Dairy Character

Dairy bulls should have angular conformation rather than rectangular. They should be fairly sharp over the withers and smooth in the thighs. The neck should be long, lean, and masculine. There should be no tendency toward fattiness. The skin should be milky, loose, and pliable and the animal should have a fine hair coat.

The rudimentary teats should be well spaced and wide apart. The testicles should be normal in size.

### Body Capacity

A long, wide deep barrel is desired. Width between the front legs and spring of fore rib is necessary. Dairy animals must be able to consume large quantities of roughages.



## **Feet and Legs**

Sound feet and legs are very necessary in dairy animals and especially so in the case of bulls. Bulls need straight legs, set out on the corners. The pasterns should be strong and springy.

## **Disposition**

A bull that is active is desired, but nervous and mean animals ought to be avoided. The disposition of the bull determines the methods which may be used in handling him and may determine the use which may be made for him in the herd.

## **Pedigree and Record**

Methods of artificial insemination have made it possible to make more effective use of proven bulls. Most bulls used in artificial insemination in advance dairy countries are proven sires or trace back to proven sires and high producing dams.

It is not always possible for the average dairymen to use a proven sire. In India, due to lack of availability of production records and other factors, such as late maturity of the animals, the system of proven sires is not very much practised.

A bull mother or bull calf sisters should not yield less than 3000 lit. of milk in 305 days of lactation in its peak productive life i. e. in 3rd lactation, 2250 lit. in 2nd and 2000 lit. in 1st lactation. This means that bull mothers or her sister's should have a peak yield of more than 12, 14 and 16 litres of milk/day in 1st, 2nd and 3rd lactation, respectively.

The rate of growth is an important factor which is indirectly related to the age at maturity in heifers and thus a bull calf showing less than 500 gm body weight gain/day upto the age of 2 years should not be selected for breeding purposes. The first selection of bull calf be carried out on the basis of birth weight, 6 months and 1-1½ years body weight and final selection on the basis of libido, semen quality and its freezability. Keeping all these factors in view the bulls of superior pedigree should be subjected to test mating and on the basis of its progeny test records, if having breeding value at least one S. D. above the breed average should be extensively used in mating of elite dams.

## **Selection of Bull Mothers**

Selection of bull mothers may be done on the performance of her own records, on the basis of its pedigree or collateral relatives



records. Emphasis should be given to the traits like milk yield, age at first calving and breeding efficiency. The bull mothers which are high yielder can be subjected to super ovulation and the embryos such obtained can be transferred to foster mothers. The progeny produced through such dams of high genetic merits will serve as the future bull mothers and bulls as the case may be. The embryo transfer technology will take some time to establish itself on firm footings.

## FEED ENRICHMENT TECHNOLOGIES

Rearing of livestock, particularly, cattle and buffaloes in Haryana, is one of the major components of farming systems and plays vital role in the economy of the farmers. But inadequate nutrition as a result of scarcity of feeds is the main constraint in the way of livestock development programmes. The situations becomes alarming and poses a serious threat to livestock population affected with a severe drought and heavy floods. Consequently, the livestock remains underfed and thus their genetic potential is not fully exploited and the performance remains sub-optimum. To solve this, the Department of Animal Feed Technology had developed the following technologies, which can be adopted by the farmers or feed industry men, for ultimate benefit of the livestock owners :

### 1. Feeding of Urea Treated Straws

Poor quality roughages, such as straws, are potential source of energy, but are inefficiently utilized by animals due to their low nitrogen and high fibrous contents. Treatment of straws with urea improve their nutritive value by 20 per cent and the treated straw can be fed *ad lib* to dairy animals of all categories.

**Treatment :** Dissolve 4 kg urea in 60 kg water and spray on 100 kg wheat/paddy straw. Mix thoroughly and make the heap of the treated straw, cover it with polythene sheet or any other material to make the heap air tight and allow for atleast 4 weeks and then open it and feed to animals. In this process some ammonia remains in unbound form, therefore, the treated straw needs to be aerated before feeding to improve palatability and feed consumption. The treated straw can be stored for any length of period (upto 1 year) without deterioration in quality.



This simple technique of straw with urea can be easily adopted by the farmers in Haryana, who store most of their wheat bhoosa in the form of heaps/bongas and plaster these with mud.

## 2. Feeding of Liquid Feed Supplements

It is a molasses-urea-mineral mixture fortified with Vitamin A and D<sub>3</sub>. Studies have shown that liquid feed given with cereal straws can sustain maintenance requirement and if given limited green fodder/concentrate can support growth and low milk production and thus enables farmers to reduce the cost of feeding considerably.

**Preparation :** The principle of urea molasses liquid feed preparation is the homogeneous mixing of urea in the liquid molasses. This department recommends the following formula and the procedure for its preparation.

Urea=2.5 parts in 2.5 parts of fresh water

Common salt=1 part

Mineral mixture=2 parts

Molasses=92 parts

Vit. A+D<sub>3</sub>=25 g each per 100 kg of liquid feed.

The urea is completely dissolved in the water and poured gradually with a simultaneous mixing in the containers. While mixing, powdered salt, mineral mixture and vitamins already mixed thoroughly are sprinkled over the molasses and mixed uniformly. In winter, molasses viscosity increases, thus for thorough mixing heating of the molasses is required. This product can be safely stored for about 3 months.

Urea-molasses feeding is a new system and sudden shift of animals from conventional feeding to liquid feeding may cause digestive disturbances. It is, therefore, advised to introduce liquid feed gradually in the ration of animals in about 15 days period.

## 3. Feeding of Urea-Molasses-Mineral Block (UMMB)

The UMMB is a nutrient animal lick in a solidified block form, which contains essentially needed nutrients, such as soluble



and fermentable N from urea and highly fermentable energy from molasses. It also contains the essential major and minor minerals through the incorporation of mineral mixture. Natural protein sources like mustard cake, deoiled rice polish have also been added to provide the preformed peptides and amino acids to provide a part of requirements for rumen microbes. As such the UMMB lick block is an excellent supplement for ruminants to increase their productivity by way of enhancing the efficiency of utilization of urea and low cost feed like cereal straws.

### Composition of UMMB lick blocks

Molasses	40
Urea	10
Mineral mixture	4
Calcium oxide	9
Sodium chloride	1
Phosphoric acid	2
Mustard cake	10
Deoiled rice polish	24
Intake	=300 gm/day
Protein intake/day	=130 gm/day/animal

### Manufacturing process

The UMMB are manufactured by utilizing exothermic chemical reaction. This involves the chemical reaction of calcium oxide, phosphoric acid and molasses. Heat generated during chemical reaction is utilized for gelling effect as well as for hardness of block. The required amount of calcium oxide and phosphoric acid is added to the measured quantity of molasses and while mixing other ingredients like mustard cake, deoiled rice bran, mineral mixture, common salt and vitamins are added in required proportions. All ingredients are fully processed and then discharged into special moulds kept to cool. The material cools into hard solid block.

The UMMB lick is non-hydroscopic in nature, it can safely be fed and stored during all seasons of the year. Licking may be slow initially, which can be induced by sprinkling concentrate/urea flour over the block, especially for beginners. Large animal can lick about 800 gm and young growing animal about 500 gm per day.

#### **4. Feeding of Roughage Based Complete Feed Block**

Every year one part or the other of this country is affected with drought or floods, resulting into famine conditions which pose serious threat to livestock population. In such a situation the poor quality roughages like cereal straws are transported from surplus region to deficit region, but due to their low bulk density the transportation cost is not economical. The nutritive value of these crop-residues needs to be enhanced and it is well known that blending of poor quality roughages with concentrates, minerals and vitamins in a balanced mixture increases the utilization of these roughages. To achieve these objectives, and to reduce the cost of animal production, the densified complete feed blocks were developed.

#### **Development of feed block making machine**

Initially a hand operated press machine was developed and got fabricated in the Department of Agricultural Engineering. In this machine an ordinary jacket of 50 tonnes capacity was used to apply pressure. The dimensions of the jacket were 9"×9"×12" and capacity was 2 kg equivalent to wheat/paddy straw. An iron plate (lid) was used at upper end of the jacket so that after required pressure and time the block can be taken out of the jacket after removing the lid plate. Thereafter, the automatic (power operated) hydraulic press for feed block production was developed by this department. In this machine a pressure gauge has also been provided to measure the pressure applied for pressing the material.

Now the automatic commercial feed block making machine has been fabricated from M/s Kay Iron Works, Yamuna Nagar, Haryana which is in the process of installation in this department.



## Composition of different feed blocks

Ingredients (%)	Growth	Maintenance	Lactation
Wheat/paddy straw	60	74	30
Barseem	—	—	30
Mustard cake	19	—	15
Deoiled rice bran	5	9	—
Barley	—	—	10
Urea	1	2	—
Molasses	10	10	10
Mineral mixture	2	2	2
Common salt	1	1	1
Calcium oxide	2	2	2
Vitamin mixture	25 gm	25 gm	—
<b>Nutrients (%)</b>			
Total protein	12.1	9.5	12.6
DCP	8.0	5.5	7.7
TDN	61.5	58.5	62.6

## Formulation of complete feed blocks

A fixed amount of straw is taken and then mixed with required quantity of concentrate, molasses, mineral mixture and other binders. The different levels of binders (2 per cent) are added by mixing with required quantity of water to maintain the required moisture level (15 per cent) and mixed thoroughly with hand or in a mixer. The complete feed mixture thus obtained was allowed over-night so that straw particles may absorb moisture and therefore, converted into blocks in block making machine.

In the formation of these densified feed blocks, it was found that 15-17.5 per cent moisture level and 15 per cent molasses was most optimum. The bulk density of complete feed blocks increases three times. There was no adverse effect on the feed intake and nutrients digestibility due to compression of feeds. These blocks can be stored for any length of period (upto 1 year) without any deterioration.

## 5. Feeding of Uromalt-40

The major problem in using NPN compounds, specially urea as a protein source in ration of ruminants is its quick hydrolysis in the rumen, leading to high rumen concentration of ammonia beyond the capacity of rumen microbes to utilize it for the synthesis of microbial protein. Utilization of urea can be improved if its solubility and rate of hydrolysis in the rumen is reduced. To solve the problem of rapid hydrolysis of urea in the rumen, the urea was complexed with germinated barley. Barley is most commonly used source of energy for ruminants and it contains 9% crude protein.

### Development of 'Uromalt-40'

Barley grains were soaked in equal amount of water (w/v) for 96 h in large plastic troughs. Then the germinated barley (malted) was sun dried and was ground in a hammer mill having conventional size screen. To make the mixing easy urea was dissolved in sufficient amount of water and then mixed with ground barley so that the final product contain 40% CP. The moisture content of the mixture was about 25 per cent. The mixture was cooked in large iron pan with continuous stirring to avoid charring of the product for 10 minutes. The product was cooked at room temperature and the final moisture content of the product was 15 per cent. The product was granular in physical form and to increase its storability the moisture content was further reduced to 10 per cent by sun drying.

On the basis of trials conducted in various type of animals, it may be inferred that this product can be fed in place of oil cakes like G. N. C. and Cotton seed cake.

## 6. Utilization of Paddy Straw as Animal Feed

The paddy production in Punjab and Haryana has increased many folds in last two decades resulting in the availability of paddy straw in plenty for livestock feeding. In many parts of the country it is already being used as an animal feed, but in several other areas like Haryana and Punjab, it is burnt by the farmers in their fields which is not only a heavy economic loss to them but also causes air pollution. Farmers in these areas consider paddy straw as animal feed inferior to wheat straw. However, several studies



conducted in this department indicated that there was not much difference in their chemical composition and animal performance and thus paddy straw is as good as wheat straw in ruminant feeding.

#### Chemical Composition and Performance of Animals on Wheat and Paddy Straw Diets

	Wheat straw	Paddy straw
DM	90.02	88.98
CP	2.41	2.93
CF	41.52	30.35
EE	0.57	1.27
NFE	44.43	49.78
Ash	10.43	15.33
<b>Performance</b>		
Body wt gain/animal/day (g)	661	641
Milk yield (kg/animal/day)	6.97	6.75
6% FCM yield (kg/animal/day)	14.05	14.09
SCM yield (kg/animal/day)	15.87	15.67
Fat % in the milk	6.86	7.01
TS % in the milk	15.85	15.83
SNF % in the milk	9.05	8.77
CP % in the milk	3.60	3.66

#### 7. Strategies for Augmenting Feed Resources during Drought

Almost every year one or the other part of the state is affected with drought/floods of varying intensity, which poses a serious threat to human as well as livestock population while on food front we may not experience much problem because of our reserve stock, but the livestock is most adversely affected due to scarcity of feeds. This is a challenge and we must face it squarely. If joint efforts are made with all seriousness, we can tackle the situation without much difficulty and thus can save livestock from heavy losses and the situation can be averted through appropriate and timely action at different levels, as suggested below :

1. Planning for increased fodder production.
2. Appartioning of land for fodder production.
3. Collection and processing of available feed stuffs.
4. Establishment of fodder banks.
5. Timely action by state Animal Husbandry Department, development departments, research institutions and farmers.

GREEN FODDER PRODUCTION

Summer Fodder Crops

S. No.	Operations	Sorghum	Bajra	Maize	N. B. Hybrid	Cowpea	Guar
1	2	3	4	5	6	7	8
01	Varieties	JS-20 HC-136 SSG-59-3	S-530 S 1/3 F <sub>2</sub> of any hybrid	African tall, Vijay Com- posite	N. B. hybrid- 21	HFC 42-1 FOS-1	HFG 119
02	Soil preparation	One ploughing by soil turning plough followed by two harrowings and ploughing	2-3 harrowings followed by ploughing	3-4 harrowings followed by ploughing	2-3 ploughings	2 ploughings followed by ploughing	1-2 harrowings followed by ploughing
03	Sowing time	March 20- April 10 for Sorghum and April for Sweet Sudan	End of March to 1st week of April	March	March	March-April	April
04	Seed rate (kg/acre)	20-24 Sorghum 12-14 Sweet Sudan	4	24	9000 root-lots per acre	16	16



05	Sowing method	Pora at 25 cm apart in rows	Pora or Kera at 30 cm apart in rows	Pora at 30 cm apart in rows	Planting at 75×60 cm spacing	Pora with 30 cm line spacing	Pora at 30 cm apart in lines
06	Fertilization (kg/acre)	20N+6P <sub>2</sub> O <sub>5</sub> at sowing 10 N after one month 10 N after each cut	20 N at sowing and 10 N after one month	20 N at sowing and 10 N after one month	25 N at sowing and 12 N after each cut	10 N + 25 P <sub>2</sub> O <sub>5</sub> at sowing	8 N + P <sub>2</sub> O <sub>5</sub> at sowing
07	Interculture	One hoeing after 15-20 days	One hoeing after 20 days	One hoeing after 15 days	One hoeing after one month	One hoeing after 20 days	One hoeing after one month
08	Irrigations	5(15-20 days intervals)	3-4	5-6 (10-15 days interval)	10-15 days interval during summer.	4-5 (15 days interval)	2-3
09	Green fodder yield (q/acre)	JS 20 160-170; HC-136 200-240; Sweet Sudan 300 (3-4 cuttings)	160	140	600 (5-6 cuttings)	130	120

## Kharif Fodder Crops

S. No.	Operations	Sorghum	Teosinte	Bajra	Cowpea	Guar	NB-21
1	2	3	4	5	6	7	8
01	Varieties	JS-20, SSG 59-3, HC 136, 171 and 260	Unnet Makchhari	F <sub>2</sub> of any hybrid	FOS-1 No-10, HFC 42-1	F9-277, HFG-119	NB-21
02	Sowing time	20th March to 18th April 20th June to 10th July	20th June to 15th July	20th March to 10th April	March to July	April to mid-July	March to September
03	Seed rate	20-24 kg and 10-12 kg per acre	16-20 kg/acre	4 kg Bajra + 5 kg cowpea per acre	16-20 kg/acre	16-22 kg per acre	11,000 sets per acre for intercrops
04	Fertilizers (kg/acre)	20 kg N rain-fed	40 kg N (20+20) per acre	30 kg N/acre	10 kg N + 25 kg P <sub>2</sub> O <sub>5</sub>	8 kg N + 20 kg P <sub>2</sub> O <sub>5</sub>	20 tonnes FYM 12 kg N/cut per acre
05	Irrigation	5-6 irrigations Summer 1-3 for kharif	1-3 irrigation	3-4 irrigation	3-4 irrigation 2 cuts	—	10-15 days summer, 15-20 days spring and autumn
06	Insects	Shoot borer 500 ml Indosal/acre	—	—	Jarrid 200 ml Malathion/acre	Green Jarrid Malathion/acre	—
07	Diseases	Red leaf spot Taller cut variety	—	—	—	—	—



# Rabi Fodder Crops

S. No.	Operations	Barseem	Lucerne	Oats	Senji
1	2	3	4	5	6
1.	Varieties	Mescavi	T-9	HFO-114, Kent (multicut) and OS-6, OS-7 (single-cut)	FOS 1
2.	Soil preparation	2-3 harrowings 1 planking	One deep ploughing followed by 2-3 harrowings and planking	2-3 harrowings, one planking	2 harrowings, one planking
3.	Sowing time	End of Sept., Oct. end	End of Oct., last week of November	Mid Oct. to Nov. end	End of Sept. & end of Oct.
4.	Seed rate (kg/ha)	20-25	10-12.5	75-100	20-25 (unhusked)
5.	Sowing method	Broadcasting in standing water	Kera method, 3-5 cm deep 30 cm apart in rows	Kera or pora method 22.5 cm apart in rows	Kera method 30 cm in rows
6.	Fertilization (kg/ha)	25 N, 70 kg P <sub>2</sub> O <sub>5</sub> at sowing time	25 N, 100 P <sub>2</sub> O <sub>5</sub> at sowing and 125 P <sub>2</sub> O <sub>5</sub> every year in October	40 N at sowing, 20 N at first irrigation and 40 N after first cut	40 P <sub>2</sub> O <sub>5</sub> at sowing
7.	Irrigation	First irrigation about 1 week after sowing afterward 10-20 days interval depending upon	First irrigation one month after sowing, 10-15 days in summer, 15-20 days in spring, 20-25 days in winter.	First irrigation after one month, 2-3 subsequent irrigations	2 irrigations

1	2	3	4	5	6
		temperature and evaporation load			
8.	Cutting management	First cut 60 days after sowing subsequent at 30-40 days interval	First cut after 3 to 4 months after sowing & subsequent 30-40 days interval	For single cut 90-100 days (50% flowering) for two cut, first cut 60-70 days after sowing and second cut at 50% flowering	At 50% flowering
9.	Green fodder yield (q/ha)	780-825	750-770	450-550	200-250



## MANAGEMENT PRACTICES FOR PIG KEEPING

The pig occupies a unique place in animal production because of the following features :

1. It is the best converter of the feed.
2. The dressing percentage is very high.
3. Though it is called scavenger but basically the animal believes in living in clean place.
4. Pig can use the left overs in the field/house, hotels, hostels, etc.

The single largest cost item in pig keeping is its feed which accounts for more than 70% of the cost of pork/becon production. The following practices can be used to increase the profit :

- (a) The immunization schedule in vogue for swine should be meticulously followed.
- (b) They should be regularly dewormed.
- (c) They should be raised mainly on crop waste/hotel waste/house waste, hostel waste, etc. with supplementary diets.
- (d) They should be regularly culled and proper selection method should be followed.
- (e) Proper and regular marketing of the finishers should be assured.

### MANAGEMENT RECOMMENDATIONS FOR SWINE DURING BREEDING-GESTATION FOR PROFITABLE PRODUCTION

#### A. General Management

1. Gilts to be retained for the breeding herd should be separated from the market herd at 4 to 5 months of age or at 65-80 kg of body weight. They should have at least 12 well developed teats.
2. Gilts should be at least 8 months old and weigh near 110-115 kg before they are bred.

3. Deworming of sows and gilts before they are bred is recommended and sanitary measures should be followed to prevent reinfestation.
  4. "Flushing" (increasing feed intake) during the breeding season is recommended. The feed intake should be increased 7 to 10 days before breeding starts and maintained until all sows or gilts are bred.
  5. Under conditions of hand, or individual mating, two services per sow or gilt are recommended. The first mating of gilts should be on the first day of oestrus and the first mating of sows on the second day of oestrus. The second service should follow the first by 24 hours.
- (Note : When only one mating can be made during the oestrus period, it is recommended that gilts and sows be served on the second day of oestrus)
6. When weaning under two weeks of age, it is recommended that sows be bred on the second heat period after weaning. It is generally satisfactory to breed sows on the first heat period following weaning at three or more weeks.
  7. It is recommended that gilt and sows be kept separate during the gestation period, unless they are fed a bulky ration.
  8. Effective mange and lice treatment is recommended during gestation.
  9. Boars should be 8 months old before being used in the breeding herd.
  10. Whenever practical, it is recommended that boars be used to service several sows or gilts outside the breeding herd prior to serving those in the breeding herd.
  11. Boars of the same age or size can be run together during the off-breeding season. Boars of different ages, junior and mature, should not be run together.
  12. The recommended size of exercise plot for holding a boar is 1/4 acre.



13. The maximum number of services per boar should be :

	Per day	Per week	Per month
Mature boar*	3	12	40
Junior boar*	2	8	25

14. The use of a breeding crate is recommended when breeding gilts to old boars. It is often desirable to use a breeding crate when mating old sows to young boars.

15. Hand or individual mating of boars to sows or gilts is recommended over field mating. However, if field mating is practiced, two methods are recommended. One method is to split the sow or gilt herd so as to have one boar per group. Another method that is recommended is to alternate boars in the sow or gilt herd; that is, use one boar or set of boars one day and another boar or set of boars the next day.

16. On good legume or legume-grass pasture, allow 10 to 12 gilts or 8 to 10 sows per acre.

17. The square feet of housing or shade per animal should be as follows :

	Winter (housing)	Summer (shade or housing)
Gilt, or junior boar	15 sq. ft.	17 sq. ft.
Sow, or mature boar	18 sq. ft.	20 sq. ft.

## B. Feeding Management

1. Hand feeding of sows and gilts during gestation is generally recommended as greater utilization of pasture and other desirable roughages can be attained and the condition of the sows and gilts can be more closely watched, but specially adapted bulky rations can be successfully self-fed.
2. When sows and gilts are self-fed during gestation, the number per linear\*\* foot of feeder space, or self-feeder hole, should be as follows : Pasture 3 to 4; Drylot 2 to 3.

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\*Mature boar considered to be 15 months or older, junior boar under 15 months.

\*\*Linear foot=One foot of feeder or watering space. For example, a 6-foot feeder open on both sides has 12 linear feet of feeding space. The same principle applies to trough space.

3. For hand feeding in troughs of gilts and sows during gestation, or for hand watering, the linear foot of space required per gilt or sow is  $1\frac{1}{2}$  to 2 feet.
4. When alfalfa hay is fed in a rack, 4 sows may be fed per linear foot of rack space.
5. Bred sows and gilts may be used to glean corn left in fields, provided an excessive amount of corn is not on the ground and supplement is available.
6. One automatic watering cup should be provided for each 12 gilts, or for each 10 sows. (An automatic waterer with 2 openings should be considered 2 cups) Additional watering space may be required during warm weather.

## MANAGEMENT RECOMMENDATIONS FOR SOW AND LITTER

### A. Housing and Shelter

1. A farrowing house temperature of 55° to 65° F is recommended provided adequate ventilation is obtained.
2. Heat lamps placed in a corner, accessible only to pigs, are recommended especially when the farrowing house temperature falls below 65°F. If a heat lamp of 250 watt size is used, it should be suspended approximately 24 inches above the bedding.
3. Farrowing pens in a central farrowing house or individual farrowing house should have a minimum size of 6 feet by 8 feet for gilts, and 8 feet by 8 feet for sows.
4. Farrowing stalls or crates should have width of 20 inches for gilts and 24 inches for sows, and minimum lengths of 6 feet for gilts and 7 feet for sows. The space beneath the bottom board should be  $\frac{1}{2}$  the stall width. The recommended minimum width on each side of the stall or crate for pigs up to 2 weeks is 18 inches.
5. Guard rails 8 inches above the bedding and 8 inches from the wall are recommended in central farrowing house pens and individual farrowing houses.



6. The farrowing pen or individual farrowing house should be lightly bedded with chopped or short straw or hay, shavings, ground corn cobs, bagasse, peanut hulls, cotton seed hulls, oat hull or other suitable bedding material. More liberal bedding may be used in unheated houses during cold weather provided it is short or fine material that will not interfere with the movement of the pigs.
7. Recommended shade area is 50 square feet per gilt and litter and 60 square feet per sow and litter.

#### B. Feeding and Watering Space

1. For self-feeding either in dry lot or on pasture, a minimum of one linear foot of self-feeder space or one self-feeder hole per sow or gilt and litter is recommended provided the young pigs have additional feeding space in a creep.
2. For hand-feeding in troughs either in dry lot or on pasture, a minimum of  $1\frac{1}{2}$  linear foot of feeding space is recommended per sow or gilt and litter provided the young pigs have additional feeding space in a creep.
3. For watering by automatic cup, provide at least one cup, not less than 6 inches in diameter or the equivalent, for each 4 sows or gilts and their litters (An automatic waterer with 2 openings should be considered 2 cups). For hand watering in troughs, provide at least 2 linear foot of trough space per sow or gilt and litter. Additional watering space may be required during warm weather.
4. Creep feeding from the beginning of the first week is recommended. The maximum number of pigs per linear foot of feeder space should be 5. The edge of the feeder trough should not be more than 4 inches above the ground or floor. A maximum of 40 pigs per creep may be allowed.

Creep feeders should be placed close to a water supply, and near the area where the sow is most of the time. They should be inside, in a well lighted place in cool weather, and when placed outside in warm weather should be covered to provide shade and protection from rain.



## **General Management**

1. When possible, the size of litters should be adjusted to the number of functioning teats or nursing ability of the sow. Transferring pigs from sow to sow should be done as early as possible. Three to four days after farrowing is usually the maximum length of time that this can be done, unless the odor of the pigs is masked, when it may be possible to transfer at a later time.
2. For large litters, pigs that are to be transferred, or when injuries to pigs or sows, teats are problem. Clipping needle teeth of pigs at birth or the first day is recommended. Only the tips of these teeth should be clipped.
3. Anemia in pigs farrowed in houses should be prevented beginning the first week by making clean soil or make available, copper as solution on the sow's udder, individual iron pills, or other methods. This also may be necessary for pigs farrowed on pasture, when weather is unfavourable.
4. The age at which litters and sows may be run together should usually be 2 weeks, although small groups may be put together as early as one week. The age difference between such litters should not be more than one week in a central farrowing house or 6 on pasture.
5. On good legume or legume-grass pasture, allow 6 to 8 sows or gilts and their litters per acre.
6. Castration of the pigs should be done during the first 4 weeks. It should not be done during the 3 weeks following cholera vaccination. Also, pigs weaned at 4 weeks or earlier should not be castrated within one week of the time of weaning.
7. Pigs should be protected from infection by worms as well as other disease by good sanitation. Deworming before weaning is not recommended and it should not be done within the 3 weeks after vaccination with living (virulent or modified) hog cholera virus.
8. Cholera, erysipelas and certain other diseases are prone to affect swine in various parts of the country. These diseases,



where they do arise, can limit other efforts toward efficient pork production. Therefore, veterinary medical advice should be sought with regard to proper methods of vaccination and other disease control measures.

#### D. Weaning

1. Pigs may be successfully weaned at 5 to 6 weeks without the use of a sow's milk substitute when proper nutrition and management are practised.
2. If pigs are to be weaned at 5 weeks or earlier, the following conditions are recommended :

Age in weeks	5	4	3	2	1
Minimum pig wt. (kg)	9-9.5	6.5-7	5-5.5	4-4.5	2-2.5
Farrowing house temperature, (°F)	60	65	70	75	75
Minimum floor space per pig (sq. ft.)	6	5	4	4	4
Maximum no. of pigs per linear ft. of feeder space	4	4	4	5	5
Maximum no. of pigs per linear ft. of water space	10	10	12	12	12
Maximum no. of pigs per group	25	20	10	10	10

For early weaned pigs, housing that is warm, dry, and draft free is required. Supplemental heat such as a heat lamp and special feeders and waterers are recommended.

### MANAGEMENT RECOMMENDATIONS FOR GROWING-FATTENING SWINE

#### A. Feeding Management

1. The number of pigs per linear foot of self-feeder space of pigs per self-feeder hole should be :

	In dry lot	On pasture
Weaning to 35 kg	4	4-5
>35 kg to market	3	3-4

2. The percentage of self-feeder space given to protein supplement should be :

	In dry lot	On pasture
Weaning to 35 kg	25%	20-25%
>35 kg to 55 kg	20%	15-20%
>55 kg to market	15%	10-15%

3. Three self-feeder holes or 3 linear feet of mineral box space, should be allotted for 100 pigs when salt or a mineral mixture is fed free-choice.

4. For hand feeding in troughs, or for hand watering, the length of the trough per pig should be :

Weaning to 35 kg	0.75 ft.
>35 kg to 55 kg	1.00 ft.
>55 kg to market	1.25 ft.

(A 10 foot trough is considered to provide 10 feet of feeder space whether pigs eat from one or both sides).

5. When pigs are confined from weaning to market, 15 sq. ft. of feeding floor space should be provided per pig if the pigs are fed from troughs and 10 sq. ft. of feeding floor space if fed from self-feeders. This is in addition to sleeping space.
6. One automatic watering cup should be provided for each 20 pigs. An automatic waterer with 2 openings should be considered 2 cups.
7. The minimum capacity waterer for 10 pigs per day should be 95 l in the summer time and 55 l in the winter time.
8. The drinking water should not fall below a temperature of 35 to 40 °F during the winter.

## B. General Management

1. The area of shelter provided should be :

	Summer time (Shade or Housing)	Winter time (Housing)
Weaning to 35 kg	7 sq. ft.	6 sq. ft.
>35 kg to 55 kg	9 sq. ft.	8 sq. ft.
>55 kg to market	13 sq. ft.	10 sq. ft.



2. The use of sanitary hog wallows during hot weather is recommended. Up to 50 pigs can be accommodated per 100 sq. ft. of wallow provided shade or shelter is near by.
3. Ringing of pigs is recommended where rooting become a problem.
4. A programme of strict sanitation to prevent infestation is recommended for control of round worms in swine. Where such a programme is not effectively carried out, deworming of pigs soon after weaning, and repeated later if needed is recommended.
5. Effective mange and lice treatment is recommended at weaning and whenever needed thereafter.
6. On good legume or legume-grass pasture allow 20 growing-fattening pigs per acre on a full feeding programme and 10 to 15 per acre on a limited-feeding programme.
7. Pigs of widely varying weights should not be run together. It is recommended that the range in weight should not exceed 20% above or below the average.

#### Vaccination schedule of important diseases of pigs

Disease	Vaccine, dose & route	Remarks
(i) Swine fever*	Lapinized swine fever vaccine @ 1 ml S/C	Vaccine can be used for all categories of animals irrespective of age, breed and sex.
(ii) Swine erysipelas	Swine erysipelas vaccine	At the age of 5-8 weeks or in pregnant sows 4-6 weeks before parturition. Repeat after every 6 months.

\*From Deputy Director, Haryana Veterinary Vaccine Institute, Hisar.

**NOTE :** Purchase all the vaccines from Govt. agencies or authorised chemists. Transport under ice and store under ice or in refrigerator. Use vaccine immediately after reconstitution as per guidelines/literature given along with the vaccine. Protect from direct sunlight.

# MANAGEMENT PRACTICES FOR SHEEP FARMING

Sheep farming is the main source of income to the poor and landless farmers particularly in arid and semi-arid regions of the country, where there is scarcity of rainfall or irrigation facilities. In order to raise the economy of the poor and landless farmers, sheep production in terms of meat and wool, is to be improved by adopting the advanced techniques of management and breeding. Primarily in this region, the sheep is reared for wool. Hence, the wool production in terms of quality and quantity is to be improved. In view of this, the following points need to be considered to economise and encourage the sheep farming in this region.

## Selection of Animals

For starting the sheep unit, first step is the selection of foundation stock suited to the agro-climatic conditions of the region. Since sheep rearing is the profession to landless and poor farmers, so the emphasis in these regions should be on the rearing of wool type sheep with some attention on the body weight, as the males produced are to be disposed off for the market. The following points are to be considered while making selection :

1. It should confirm to the optimum body size and particularly the male should look like male having the normal development of the body and the reproductive organs particularly the testes should be well descended and well developed.
2. The wool quality should be fine i.e. should have less fibre diameter and medulation percentage as the fine wool fetches more price.
3. The quality of the wool may be judged from the density of wool fibre per unit area.
4. If the animals are to be purchased from any organised farm, the records of the animals maintained at the farm may be verified.
5. The Nali sheep is well suited for the area. However, for introduction of the exotic blood for wool finness the crossbred rams may be purchased from organised farm.



6. The pure exotic rams suited for the region may be Russian Merino or Rambouillete who have good sex libido and are adapted to this climate, thus can be used for cross breeding.

### Space Requirements

The simple thatched sheds with some open space may be used for sheep housing :

Floor space requirement :

Type of animals	Covered area	Open paddock	Max. no. of animals per pen
Ewe	1.0	—	60
Lambs	0.4	—	75
Ram	3.4	—	

### General Management

The sheep should generally be maintained on pastures. They should have grazing for atleast 8 hours per day.

1. In scarcity conditions the feeding may be supplemented with some concentrate having 20% CP.

2. Sheep requires one to two kg of grass or hay per day depending upon age and body weight.

3. In scarcity seasons, some leguminous hay or pala leaves may be preserved for feeding. Gram bhusa is the important feed stuff for sheep which is easily available in the villages.

4. During the breeding seasons, the rams may be provided with extra concentrate ration at the rate of 250 gms per day to maintain their sex libido.

5. The ewes in the last month of pregnancy should be properly fed to get the heavier lambs.

6. The young lambs should be allowed to suckle only two times i.e. in the morning and evening. In addition to this they may also be provided some concentrate and green to meet the optimum requirement for growth.

However, for producing the heavier lambs at market age to fetch more price the following rations are recommended :

During Summer : G. N. Cake 20% Wheat bran 35%, Crushed grain 10%, Oats and Barley 35%.

During Winter : Wheat bran 25%, Oats/Barley/Jawar 50%, G. N. Cake 25%.

## **Identification**

For identification and maintaining the pedigree, ear tags available in the market may be used. However, in the absence of tags, colour marking can be used.

## **Care of Young Lambs**

1. The ewes having no milk or disowning their lambs should be identified so that the lambs may be given extra feeding.

2. The suckling should be allowed twice a day i.e. morning and evening. Keeping the lambs together with the ewes is injurious for the health of ewes and lambs both.

3. They should be protected from severe cold and heat.

## **Weaning**

The lambs should be weaned at the age of 90 days.

## **Shearing**

1. The shearing is done twice a year at the interval of six months i.e. in March-April and September-October.

2. First clip should be taken at the age of six months.

3. Before the shearing, the animal should be washed by passing them through running water to make the wool free from dust. This will fetch higher price.

4. The shearing should be close to the body avoiding cuts.

5. The wool shorn from legs and belly should be kept separate as it is likely to lower the price of wool.



6. Shearing may be done manually by ordinary scissor or the help of shearing machine can be taken from Govt. Organisation.

### **Storing of Wool**

The wool should be dry before storing and should be stored at the place free from moisture.

The naphthelene balls may be mixed with the wool to avoid the loss due to insects.

### **Marketing**

1. Haryana state has its wool grading and marketing department whose centres are at Lauharu and Hisar. So the wool may be sold to this agency to fetch the reasonable price.

2. The male lambs may be sold at the age of 6 to 9 months after getting first clip.

3. The facilities for wool testing for the quality are provided by the Department of Animal Breeding, CCSHAU, Hisar.

### **Breeding Behaviour**

Sheep come in heat throughout the year but most of the animals show heat during the months of Sept.-Oct. and March-April. So the breeding may be restricted to these two seasons to avoid the spread of lambing throughout the year and thus avoiding managerial problems.

### **Disease Prevention and Control**

In Sheep, prevention is more important than individual treatment. All the treatments generally are taken for the whole flock at one time. For the efficient control of various disease problems a definite programme is to be followed.

1. Supply of clean and uncontaminated feed and water to the animal.

2. Regular and thorough cleaning of the shed.

### **Dipping**

The ectoparasites particularly the mites damage the wool and therefore, their eradication is of primary importance. The dipping

of sheep in some insecticides solution after 15 days of shearing should always be taken as a routine. However, if some case of mange is seen it can be done more frequently. The spraying will not work. The insecticides generally used are Malathione, B.H.C., Lindane etc. in suitable concentration. The care should be taken that the animal should not have any open wound and does not drink the dipping solution.

## **Deworming**

1. Since the sheep is close grazing animal and most of the time they remain on the same pasture so they are likely to catch the worm infestation from the dropping of infected animals.

2. In sheep, quarterly deworming is recommended as a routine practice to get rid of endoparasites.

3. The different drugs like, Nilworm, Panacure, Banminth, Thaibandazole, all broad spectrum anthelmintics may be used.

4. The doses and other precautions are mentioned on the packing or the advice from local Vety. Doctor may be sought.

5. The same drugs should not be used every time as the worm may become resistant to that drug.

## **Immunization**

The most common diseases occurring in the sheep are sheep pox and enterotoxaemia for which the vaccination should be taken. The vaccine for these are available in Haryana Vety. Vaccine Institute, Hisar.

2. For J. D. and Brucellosis the flock should be tested regularly for these diseases. The help for the testing may be taken from the KGKs and the Deptt. of Public Health, CCSHAU, Hisar.

## **Economics**

The economics of the sheep farming is determined to a greater extent by the size of the flock and also on the market of the products. On an average there is profit of about 80-90 rupees per sheep yearly.



## **Breeding Strategy**

For rapid progress, the future breeding strategy should have an organised programme of selection and breeding. Improvement in the production potential of sheep can be brought about by changing the genotypes and making the environment favourable for the expression of genotypes. The genetic improvement is of permanent nature which is inherited from generation to generation. The genetic improvement can be brought about through selection and breeding.

### **Selection**

The indigenous breed without affecting the purity can be improved through selection. The selection particularly of rams should be made on the basis of wool quality and body weight as these traits have reasonably high heritability.

### **Breeding**

The rapid improvement in the native stock can be brought about by crossing them with the exotic rams or by the use of crossbree ram to introduce the exotic inheritance in stages. However, the crossbreeding with pure exotic breed can be taken in the areas where good fodder conditions are available.

# MANAGEMENT PRACTICES FOR GOATS

## Importance of Goats

Goat enterprise forms an important facet of the livestock production in the economy of landless labourers, and socio-economically backward communities in the State. A variety of products is available from the goat industry. Of which chevon and milk are of major economic importance but skins, manure, fibre and other animal by-products contribute substantially to the rural earnings.

Goats are reared mainly by the poor, landless, small and marginal farmers because of the very nominal maintenance cost. Goats can thrive on shrubs, bushes, thorny vegetation and top feeds of a variety of trees. They also multiply very fast due to high incidence of twinning. Goat farming is also a moderate source of employment with a limited capacity of investment. Goats produce 35 per cent meat and 3 per cent milk out of the total meat and milk produced in the country. Besides, by export of goat skins, casings and hairs, valuable foreign exchange is earned. The manure produced from droppings enriches the soil. Goats are, however, considered to be responsible for soil erosion.

The importance of goat as subsidiary source of income for marginal and landless poor is being increasingly recognised. The low risk technology has favoured multiplication of goats which in spite of heavy take off (36%) are increasing at the rate of one million per year in the country. The inbuilt prejudices against goats is now gradually vanishing. The controversial small goat has at least created its own place in the small farmer's economy in the State.

## Advantages of Goat Rearing

1. Financial investment is low.
2. Building and equipment needs are negligible.
3. Milk and meat production is obtained at an early age.
4. Goats are prolific.
5. Goats consume less feed.
6. Goat milk is easily digested, rich in minerals and of alkaline type and thus is of clinical importance.



7. Goats help to solve unemployment problem in countryside.
8. Dairy goat provides stable income.
9. Goat manure increases crop production.
10. No prejudices against goat slaughter.

### **Breeds and Breeding Policy**

Although most of the land is used for various farming systems, yet there are some important breeds/grades of goats found in various districts of the State predominantly in Gurgaon, Rewari, Narnaul, Bhiwani, Hisar, Rohtak and Sirsa districts. Beetal and its grades are found in Hisar, Sirsa, Bhiwani, Rohtak, Karnal, Kurukshetra districts, whereas, Jakhrana and its grades are found in Narnaul, Gurgaon, Bhiwani and Rohtak districts of Haryana. Barbari goats and its grades are found along Jamna river towards Haryana comprising Gurgaon, Faridabad and Sonapat districts.

### **Breeding Policy**

On the basis of the experience, prevailing environmental conditions and results at CCSHAU on the performance traits, the following are the recommendations :

1. In large sized breeds like Beetal and Jakhrana selective breeding can be adopted for further improvement without changing their genetic condition.
2. Cross-breeding between Beetal, Barbari and Jakhrana may be adopted because of their good combining ability and potentiality for quality chevon production and milk production.
3. Large sized breeds of Beetal and Jakhrana may be utilized in improving the non-descript goats and small sized breeds.

### **Selecting doe and buck**

Vitality and good health are the primary requirements for good milch goats. The considerations in selecting stock for milk production are :

- (i) Their inherent milking capacity.

- (ii) Feed intake capacity.
- (iii) Feed to milk conversion efficiency.

Normally a goat reaches her highest yield in her second/third lactations and peak yield is about 45 days after kidding.

Male kids to be used for breeding should be selected at three months of age on the basis of their body weight and dam's production performance. Other male kids should be castrated and allowed to grow up to slaughter age (6 months).

### Feeding of Goats

Goats are naturally gifted to consume more dry matter as compared to other ruminants, which helps them to obtain most of their nutritional requirement from grazing and browsing by consuming more grain roughages. The goats can consume at the rate of 3% of their live weight, while the dairy goats are capable of consuming 5 to 7% of their live weight. However, the dairy goats in tropics generally consume on an average from 4.1 to 5.4%.

### Nutrient Requirements of Goats

The nutrient requirements of goats appear to be practically the same as those of sheep, but on account of their special characteristics mentioned above, it is necessary that systematic research work should be carried out to find out their requirements for growth, maintenance, gestation and milk production so that it may be possible to get maximum amount of milk and meat at a minimum cost. So far the nutrient requirement data of sheep are generally applied for goats.

### Nutrient Requirements for Sheep and Goat

For feeding to kids creep mixtures containing high amounts (50-60%) of maize, jowar or barley with groundnut cake should be prepared so that they may be adequate in energy and protein, having about 20% C. P. and 75% TDN and examples of the same are given below :

Ingredients	Percentage
Maize/jowar/barley	50
Groundnut cake	20
Molasses	10
Wheat bran	7
Fish meal	10
Mineral mixture	1
Salt	1
Chalk	1



To the above 150 g TM-5 or Aurofec and 25 g Vitablend or Revimin should be added per quintal of the creep mixture.

The concentrate mixture for feeding to goats in general should be prepared by using the maximum possible amounts of agro-industrial by-products so that it may be cheap and goat husbandry may become an economical proposition to the goat keepers. Keeping in view the availability of such products according to different regions in the country, the concentrate mixture may be prepared having about 20% C. P. and 65-70% TDN. An example of the same is as follows :

Ingredients	Percentage
Wheat bran/rice bran	45
Groundnut cake/seasome cake	20
Maize/barley/jowar	12
Molasses	10
Dal chunies	10
Mineral mixture	1
Salt	1
Chalk	1

Considering the utilization of non-protein nitrogenous substance by ruminants, an attempt on experimental basis can also be made to include one per cent urea in the above concentrate mixture, thereby reducing the costly cakes and adjusting the ingredients by increasing the cereal grains and molasses. This would help in lowering down the cost of concentrate mixture.

Producing the heavier kids and lambs at market age to fetch more price, the following rations are recommended :

Ingredients	Percentage
<b>During Summer</b>	
Groundnut cake	20
Wheat bran	35
Crushed grain	10
Oats/barley	35
<b>During Winter</b>	
Wheat bran	25
Oats/barley/jowar	50
Groundnut cake	25

## Goat Houses

Special attention should be given to the following points while constructing the goat house :

1. Direction of house should be East-west.
2. It should be on raised ground so as to provide dry and clean housing to goats even in the rainy season.

### Construction Material

Traditionally the goats are kept by the poor farmers in the enclosure made of mud, thorny material or some crop residues like arhar sticks etc. Tops of the shelter are generally provided by using thatched material used at the CGHRI, Makhdoom.

**Light roof :** Both for roof and sides of the house light roof material is used. In each type of houses provision is made for air circulation and sunlight by improving the parts of the side walls during day time in winters and throughout the day in summer. This type of material is more advantageous as compared to thatched roof material because of its durability.

**Thatched roof :** Very simple, cheap, comfortable both in summer and winter. But the disadvantage is that due to minor negligence, they can catch fire very easily and provide very good hide outs for ectoparasites.

Floor space requirements for sheep and goats (per animal)

Type of animal	Covered area	Open paddock	Max. no. of animals per pen
Ewe/nanny	1.0	—	60
Lamb/kid	0.4	—	75
Ram/buck	3.4	—	1 buck/ram in each shed
Milch doe	1.4 × 1.2 m	—	—

A brick wall of 2-2½ ft. height is must to protect against predators. Partition can be made of wood or iron mesh to accommodate goats in the individual pens at the time of kidding and to provide separate housing facilities for the kids in different categories. Provision can be made for milking parlour.



## Feeding-watering space requirements for different categories of sheep and goat

(per animal)

Type of animal	Space/ animal (cm)	Total manger length in a per 100 anim. (cm)	Water trough length pen for 100 anim. (cm)	Width of manger water trough (cm)	Depth of manger water trough (cm)	Height of inner water manger water trough (cm)
Adult sheep & goats	40-50	4000-5000	400-500	50	30	35
Lambs & kids	30-35	3000-3500	300-500	50	20	25

### Farm Operations

An animal farm is full of activity and life. The farm manager must see that all the activities are carried out perfectly and at proper time. The various operations are explained as under :

#### Farm Operation Calendar

(a) **Daily operations :** A schedule is drawn for daily farm operations so that all the operations are carried out at regular timings.

The daily operations are : Do all milking and kids are suckled once in morning and once in evening. All the animals are sent for grazing except sick goats and female goats in oestrous, then cleaning of sheds, disposal of droppings is carried out. Various activities like vaccination, dehorning, daily recording of data, weighing of animals etc., are routine farm operations.

(b) An annual calendar for a goat farm is suggested below for annual activities :

During January : Deworming of animals for internal parasites.  
Preparation of male and female for mating.

- During February** : It is time for segregation of animals in advanced pregnancy. Preparation of male for breeding season.
- During March** : Attend to kidding. Mating of flock.
- During April** : Culling of young stock, born in last September. Attend to new born kids and continue mating.
- During May** : Go for tattooing and attend the growing kids.
- During June** : Go for hoof trimming.
- During July** : Vaccination of flock. Dipping of flock. Weaning of kids.
- During August** : Isolate expectants. Save the animal from foot-rot. Flushing of males for coming breeding season.
- During September** : Attend to kidding and start breeding of flock. Castration of males.
- During October** : Silage preparation and attend to kidding.
- During November** : Marking of kids. Caring of growing kids.
- During December** : Castration of young male stock. Weaning of kids and trimming.

### **Dipping, Dusting, Spraying and Washing**

- Dipping** : Small animals are dipped at least twice in a year. It is done because of :
- To eradicate parasite.
  - To prevent spread of scale.
  - To remove waste products from body surface.
- Precautions** : Animals in advanced stage of pregnancy should not be dipped.
- Avoid dipping on rainy day.



- Always water and rest the animal before dipping.
- Do not dip sick animals with open wound.
- Animals can be dipped by both hand method and swim batch method.

### Common Chemicals Used in Dips

Chemical	Chemical in dip	Remarks
1. Lindane	0.031%	For young stock.
2. DDT dips	0.05% 0.5%	For adult stock. Mix 20 kg of 25% DDT wettable powder.
3. Pyrethoione Arsenic sulphide arsenic powder dip	0.2% total	Including 0.13% soluble arsenic.
4. Coal tar carsots or Phenol dip	0.76%	Including 0.36% tar acids.

### Shearing

Shearing is removing wool from sheep/goat completely, easily and with minimum discomfort to animal and operator.

The shearing should be done when there have been enough warm days to bring out grease in the fleece. Well grossed fibres are stronger and they cut more easily and uniformly. Never catch hold of the wool and pull on it, as you shear because the skin also gets pulled up and may be cut. The points of shear should be kept in good working order and take long full strokes with the shears. A wooden shearing floor, canvas, or old carpet may be used to shear goats on and to keep the fleece clean. The shearing floor should be far away from the stores, manure dumps so that their chaff may not be carried in by the goat/sheep or be blown on to the shearing floor. Before shearing, goat/sheep should be collected in a holding with elevated floors so that dung and urine do not soil fleece. Goat/sheep should be held firmly for shearing to prevent it from struggling and kicking so as to perform shearing easily and to keep the skin tight in front of shears. Shearing is now done mostly with shearing machines and also by hand with the machine, the shear does neat job, gets more wool and is not so likely to cut the sheep as with hand shear.



**Bedding/Litter :** Bedding or litter is used primarily for the purpose of keeping the animals clean and comfortable, bedding also soaks up urine, makes it easy to handle and absorbs plant nutrients. It protects the animals from cold.

The bedding should be about 10-15 cm thick. Wheat bhusa, sugarcane bagasse, chopped grass or crop residues are ideal for animal bedding.

During winter, suitable bedding should be provided to young kids.

**Dehorning/Disbudding :** Dehorning means removing horns of animals. Disbudding means the arrest of horn growth at an early age when the root is in form of bud or button.

It should be done when kid is 2-5 days old. There are several ways of dehorning. Chemical method is applicable to small herds kept under close supervision.

Caustic potash (KOH) or Caustic soda (NaOH) are common chemicals used. They are available in the form of sticks, paste or liquid.

(a) Clip the hair around the horn buds and surround the area with a ring of heavy grease or vaseline to protect the eyes against the chemical. Rub the chemical over the bud till blood comes out. Protect the hand while doing so.

(b) Electric dehorner can be used safely. The kid should be muzzled safely so that the kid can breathe freely, otherwise partial suffocation may occur.

(c) The mature goat can be dehorned by sawing off the horn close to the head by using dehorning (bone) saw.

Dehorning should be done in winter when flies are not troublesome. The wound should be dressed.

## **Castration**

Castration is removal of testicles, the glands that produce male germ cells. Male goats to be raised for meat are castrated at 3 months of age.



The best time for castration is when they are one to two weeks old. Castration should be done during cold season, avoiding rainy season for fear of fly menace. Castrated animals should be rested for few days in clean and comfortable pens. Operation wounds should be watched and dressed.

Budizzo pringers of smaller size are available for castrating sheep and goats. It is bloodless technique in which testicles are made functionless by destroying the channels of nourishment. Work the spermatic cord to the side of scrotum and then clamp one cord above the testicle by the Budizzo. Repeat same procedure on other testicles.

### **Weighing of Animals**

The goats are to be weighed to know whether they have attained market weight or not. Scientific feeding of farm animals is based on their body weight and hence they should be weighed periodically.

General loss of weight of animals in the herd is an indication of the existence of some chronic trouble like worm infestation, nutritional deficiency, infectious diseases like, TB, JD etc. Further we can know the growth record of the animal whether our management is going smoothly or not.

All the animals to be weighed should be starved for 24 hours at least and keep away from water for 6-8 hours before weighing.

### **Milking**

Goats are to milk but they should be milked scientifically at regular hours. Hygienic housing away from bucks, quick and complete milking and immediate cooling of milk eliminates the bad odour. They produce more milk than cows from the same quantity of nutrients because a goat uses less feed for maintenance than a cow.

Milking of goats is performed by stripping and fisting. Both teats should be uniformly milked, otherwise there may be disparity in their size. Goats should be milked once in the morning and once in the evening and interval between two milkings should be same as far as possible. Practice of milking one teat and leaving

the other teat for the kid is not recommended. One should perform milking by sitting either at the rear or at the right side of the goat.

## **Flushing**

About a week before the onset of breeding season, special nutrition of does should be started to promote their body weight. This practice will bring does in heat earlier thereby resulting in early kidding. It has also effect on bringing the does in heat at nearly the same time resulting in a more uniform lamb crop. Flushing also increases kiddings rate at incidence of multiple births in the flock.

Flushing ration for does consists of a good mixed pasture of legumes, grass, wheat bran, grain oil cakes.

## **Hoof Trimming**

A goat is as good as its legs. Goat seldom gets sufficient exercise on herd surface to keep down the horny growth covering the sides of the hoof.

Trimming of hoof is done monthly for well being of the goats. If neglected, it can weaken the legs and lower the milk production.

## **Heat Detection**

Theoretically goats cycle at 21 day interval. Heat detection is based on behavioural signs like restlessness, bleating, flagging the tail, reddened vulva, vaginal discharge which causes the tail hairs to stick together.

## **Flock Testing**

The flock should be regularly tested for Brucellosis, Tuberculosis, Johne's disease.

## **Culling**

Culling is the process in which certain individuals in a population are excluded for the purpose of becoming parents of the next generation.



The carrier animals positive for brucellosis, TB, JD should be culled.

## **Slaughter of Animals**

Fasting for 24 hours is essential to obtain a good carcass. The undigested food putrefies rapidly and muscle fatigue will retard efficient bleeding, adversely affecting the keeping quality.

## **Enteric Paramphistomiosis**

Paramphistomiosis is a disease of ruminants especially sheep and goats in regions with perennial irrigation facilities, flood prone, low lying and inundated areas. This disease is characterised by foetid diarrhoea, dehydration, bottle jaw and anaemia. The poor section of the farming community, rearing sheep and goats on waste land, road sides, along with canals and drains, and in low lying areas, are the worst sufferers.

**Aetiology :** The casual agents of enteric paramphistomiosis are *Gastrothylax crumenifer*, *Cotylophora indicum*, *Paramphistomum cervi*, *Fischkoederious elongatus* and *Ceylonocotyle scolio-coelium*, known as rumen flukes. The important intermediate hosts of these parasites found in Haryana state are aquatic snails namely *Indoplanorbis exustus*, *Lymnoea luteola* and *Gyraulus convexiusculus*.

**Epidemiology :** The incidence of the disease is high in Karnal, Kurukshetra, Ambala, Sonapat, Jind and Rohtak districts of Haryana state. The main reason for the spread of this disease is the presence of aquatic snails, the intermediate hosts for paramphistomes, in large numbers from July to December in ditches, ponds and low lying areas flooded with water. The grasses and other vegetation growing in and around canals, drains, ponds, lakes etc., are heavily contaminated with paramphistomes metacercariae. These metacercariae infect susceptible animals. Animals grazing on contaminated grass and vegetation suffer from infection with paramphistomes. The peak incidence of enteric paramphistomiosis has been observed between October to March every year.

**Symptoms :** The clinical symptoms include submandibular oedema (bottle jaw), watery foetid diarrhoea, dehydration and anaemia. Generally emaciation and prostration precede death. In



younger animals, the course may be shorter and death may occur without any characteristic symptoms. Fifty to sixty per cent mortality has been seen in the affected animals. The untreated animals become economically nonviable.

**Diagnosis :** The diagnosis of enteric paramphistomiosis must be based on post mortem examination. The first three meters of the small intestine is searched for the presence of immature paramphistomes which are pin-head sized, pink and deeply embedded in the mucosa. Other lesions suggestive of acute haemorrhagic enteritis could also be noticed.

**Treatment :** Anthelmintics like Zaniil (Oxyclozanide), and Nilzan (Nilverm+Oxyclozanide), marketed by Indian Explosive Limited (India) are very effective against adult and immature paramphistomes. It is expected that in endemic areas, medication will have to be repeated at every 30-40 days interval between October to March to reduce morbidity and mortality in susceptible animals.

**Prevention :** Judicious combination of snail control, pasture management, animal husbandry practices and medication will help to reduce the incidence of paramphistomiosis. Based upon the epidemiological pattern of the disease in Haryana state, it is suggested that two treatments during June to August will eliminate most of the adult flukes. This will reduce pasture contamination and ultimately reduction in the infection of aquatic snails, the intermediate hosts. During October to March, the animals of endemic areas should be treated at 30-40 days interval. This will help in removal of young flukes before they attain maturity and reproduce. Secondly, the susceptible population of animals will not get sufficient inoculum of immature flukes, responsible for enteric paramphistomiosis.

### **Gastrointestinal Nematodiosis in Sheep and Goats**

A number of species of nematodes, commonly known as round worms, are responsible for producing gastro-intestinal disorders and a number of other associated symptoms in sheep and goats.

**Aetiology :** The most common stomach worms encountered in parasitic gastroenteritis, affecting sheep and goats, are



*Haemonchus contortus* and *Trichostrongylus* spp. The less commonly involved species of nematodes are *Bunostomum trigonocephalum*, *Gaigeria pachysacelis*, *Oesophagostomum* spp. and *Strongyloides papillosus*.

**Epidemiology :** The epidemiological studies on these gastrointestinal nematodes of sheep and goats in Karnal, Ambala and Rohtak districts of Haryana state revealed that *H. contortus*, one of the most common stomach worms, had a regular pattern of high intensity of infection from July to October. *Trichostrongylus* spp. was present in high numbers from November to February. However, the incidence pattern for the less commonly involved species of nematodes was irregular.

**Symptoms :** The infected animals show clinical signs like weakness, dullness and anaemic condition. In a flock, the severely infected animals start trailing behind the flock. The usual symptoms shown by such animals are anorexia, dyspnoea, paleness of the conjunctivae and bottle jaw conditions. Rarely, the diarrhoeic symptoms are also observed. The untreated animals show prostration and die of the condition.

**Diagnosis :** The faeces of the suspected animals should be got examined for the presence of strongyle eggs. The coproculture will help in the identification of nematode species involved in such cases. The post-mortem examination of an animal, died showing the above mentioned symptoms, will confirm the presence of these worms in the gastro-intestinal tract.

**Treatment :** Anthelmintics like Curaminth, Nilverm, Banmith, Panacur, Thiabendazole, Levamisole, Mebendazole and Thiphanate are effective in removal of these round worms. From July to February, the animals should be dosed with either of these anthelmintics at an interval of 30-40 days.

**Prevention :** On the basis of studies conducted at Parasitological Regional Research Station, Uchani, it is advised that sheep and goats should not be grazed on low-lying, poorly drained land, stocking rate be kept low and forced grazing be discouraged. Secondly, young and adult stock should be pastured separately, and deworming with broad spectrum anthelmintics should be carried out at 30-40 days intervals throughout the year.



## Verminous Pneumonia in Sheep and Goats

The sheep and goats suffer from verminous pneumonia, during October-November to March-April every year, in low lying areas of Haryana state. During the peak up to 25 per cent of the animals examined were positive for lungworm larvae in the faeces.

**Aetiology :** The important parasite responsible for verminous pneumonia is *Dictyocaulus filaria* in Haryana state. *D. filaria* is about 5 to 10 cm long, whitish in colour and resembles a piece of thread. The parasites are generally found embedded in the thick bronchial exudate.

**Symptoms :** In mild infections, cough is usually strong and harsh, but in heavy infections the respiration is shallow, hurried, painful and the cough may be absent especially when pneumonia has supervened. In such cases a tenacious mucous droops from the nostrils, animal becomes listless and weak, rapidly loose condition and death occurs due to advanced pneumonia. Under natural conditions lungworm infection is frequently accompanied by substantial burdens of gastro-intestinal nematodes, consequently diarrhoea, may be a frequent entity which adds to general wasting, unthriftiness and death.

**Diagnosis :** Verminous pneumonia could be diagnosed by demonstrating typical larvae in the faeces. The diagnosis could be further confirmed by post-mortem examination of a clinical case. A large number of thread like worms are found in the bronchi, bronchioles and trachea with characteristic lesions of verminous pneumonia.

**Treatment :** For treatment, the drug of choice include Nilverm, Banminth, Curminth and Panacur. Any of these drugs at the recommended dose rate should be quite effective. It appears that the treatment should be repeated every fourth day between October to March i.e. three treatments during the peak incidence to minimise the incidence.

**Prevention :** It is advised that animals should not be grazed on wet or marshy fields and they should be fed adequately.



## Vaccination schedule for important diseases of sheep & goats

Disease	Vaccine, dose & route	Remarks
(1) Enterotoxaemia*	E. T. vaccine @ 2.5 ml S/C, repeated after 14 days with 2.5 ml S/C	Lambs above 3 months and adults to be vaccinated before the onset of rainy season.
(2) Sheep-pox*	Aluminium gel adsorbed sheep-pox vaccine (inactivated) @ 0.5 ml S/C	All lambs above 3 months old may be vaccinated. At the time of out-break nearby, all sheep need to be vaccinated.
(3) F. M. D.**	F. M. D. vaccine @ 5 ml S/C	In areas where F. M. D. in bovines is prevalent, sheep and goat population should also be protected.
(4) Black quarter*	B. Q. vaccine @ 2-3 ml S/C	Animals to be vaccinated before the onset of rainy season.

These vaccines are available from :

\*Deputy Director, Haryana Vety. Vaccine Institute, Hisar.

\*\* (i) Head, Biological Products Division, Indian Veterinary Research Institute, Izatnagar, Bareilly (U.P.)-243 122.

(ii) M/s Hoechst India Ltd. (From chemist).

(iii) Bhartiya Agro-Industries Foundation (BAIF) Laboratories, Briahnagar, Off. Wagholi-412 267, Dist. Pune (from Chemist).

## POULTRY FARMING

### PROCUREMENT, CHOICE AND REPLACEMENT OF POULTRY STOCKS

1. Poultry (chicken) is reared with two distinct objectives, viz. (i) for egg production and (ii) meat production. Likewise, two types of chicken have been genetically developed separately, for egg production (layers) and meat production (broilers).
2. Whatever the enterprise (broiler or layer), a farmer has to start with day old chicks only.
3. To raise layers the farmer should procure the female day-old (sexed) chicks only, and for broilers, the chicks to be procured are invariably straight run (mixed). Layer chicks should preferably be procured in the end of February or in March, so that they come to lay at most appropriate time in August-September.
4. The chicks should be procured from the renowned hatcheries marketing their stocks/strains under different trade names, often after consultation with the farmers already in business as well as with authorized representatives of the hatcheries, State Animal Husbandry personnel meant for poultry development and Extension Specialists of the University located in Krishi Gyan Kendras at district headquarters.
5. The addresses of a few Govt. hatcheries from where the chicks could be procured in Haryana are given under 9.
6. Most of the commercial chicks once procured will be retained as layers for at least a year after they come to lay or till they continue to give 60% production. The fresh supply or a new crop of chicks is to be assured by confirming bookings with the hatcheries well in advance of time so as to enable the farmer to maintain/expand/shrink production according to the demand and supply of factors.
7. Broilers are disposed off for the market at 6-8 weeks of age or when they attain 800 g—1 kg weight (for tandoori) and 1500 g weight for meat. The farmers must assure the supply of day-old chicks from the hatcheries in a well synchronized cycle of disposal and procurement at regular intervals depending upon the expected disposal rate of broilers. Holding broilers after 8 weeks of age is uneconomical.



8. Farmers are advised against attempts to reproduce their stocks by inter matings among the strains kept by them. This is highly specialized job to be done by qualified poultry geneticists only.
9. List of Hatcheries in Haryana supplying day-old chicks to farmers :
  - (i) Professor and Head, Dept. of Animal Breeding,  
College of Animal Sciences, CCS Haryana Agril. University,  
Hisar-125 004.
  - (a) Improved chicks for egg and meat production.
  - (ii) Professor and Head  
Dept. of Livestock Production and Management  
CCS Haryana Agricultural University  
Hisar-125 004

Turkeys are also supplied by the Department of Livestock Production and Management (day-old) in limited quantities.

- (iii) Govt. Poultry Farm  
Ambala City-134 003  
Stocks (a) HH-260 (Layer), (b) BH-78 (Layer)
  - (iv) Govt. Poultry Farm, Bhiwani  
Stocks : (a) HH-260 (Layer) (b) BH-78 (Layer)
  - (v) Govt. Poultry Farm, Hisar  
Stock : (a) BH-78 (Layer)  
Govt. Chick Rearing Centres :
    - (i) Nuh, District Gurgaon
    - (ii) Shahabad, District Kurukshetra  
Stock : HH-260 (Layer), BH-78 (Layer)
10. Addresses of a few other hatcheries and results of latest random sample tests are given in appendices 1, 2 and 3. The farmers can choose the hatcheries of their choice on the basis of random sample test results or after consultation with various agencies as suggested in 4.

## HOUSING AND EQUIPMENTS

### Floor Space

1. Provide 700-900 sq. cm of space per bird up to 8 weeks age and 1800 sq. cm of space per bird during 8-18 weeks age.

2. After 18 weeks the size of house for different number of birds is given in Table 1. A shed of 30×9 m in size should be used for 1000 layers or 3000 broilers.
3. The floor should be either of cement concrete or bricks or stone slabs. The joints between bricks and stone slabs will be filled up with a binding material.
4. Lower portion of walls on the long sides of the house upto 1/3rd height from the floor be made up of bricks masonry in cement mortar 20 cm thick. The upper 2/3rd should be wire-netting of ½ inch and 1 mm thick wire.
5. 0.30×0.30×0.30 m size nests can be constructed on two sides of house.
6. Gable roof may be used. Old timber or cement roofs with 3 meter height at all places be constructed.
7. The GS sheet or AC sheets of Aluminium roofs should be painted black inside and Aluminium paint outside.
8. Provide an opening of about 15% of floor space. All windows openings be screened with wire nettings. The windows of brooder house will have doors or arrangement of Tripal or gunny bag curtains.
9. Following equipments are needed in a broiler farm. Brooders chick feeder, chick waterer, catching crate, debeaker, grinder, grower feeder and feed bins.
10. Following additional equipments will be needed in a layer farm. Hanging feeders, vaccination kit, egg baskets, filler flats, egg boxes.

## BROODING AND MANAGEMENT OF GROWERS AND LAYERS

### Brooding of Chicks

1. Everything should be ready for the chicks in the brooder house before the chicks arrive.
2. The house should be properly scrubbed and cleaned and dried at least a week before.



3. Two to four inches deep dry litter should be spread on the floor.
4. The equipments should be well arranged and heat should be turned on 12 hrs. in advance so that surrounding is heated up to a desirable temperature.
5. Initially the temperature should be slightly above 35°C. The thermometer bulb should be placed an inch above the litter at the edge of brooder.
6. The corners of brooder room should be rounded off with cardboard to prevent the chicks from piling up in the corners.
7. The chick guard about 15 cm high should be used at a distance of 30 to 40 cm from the brooders depending upon weather conditions and should be moved apart every day and may be completely removed after one week.

#### **Brooder House Schedule**

- (a) Make sure that chicks have been vaccinated against Marek's and Ranikhet (F<sub>1</sub>) disease before placing them under brooder. Marek's vaccination is not required in broiler chicks.
- (b) Scrub, clean and refill the waterers every day with fresh and clean water.
- (c) Remove wet litter if any and replace it with dry litter.
- (d) After one week place the waterers on wire platform to avoid wet spot.
- (e) It is desirable to use antibiotics plus B complex in water during the first week.
- (f) Food should be spread on paper or in filler flat for 1st 2-3 days and then replace by chick feeder.
- (g) During 1st week maintain 32.5 to 35°C temperature in hover depending on weather conditions. Reduce it by 2.5°C every week upto 4 weeks of age.
- (h) Use brooder guards during first week.
- (i) Ensure adequate ventilation in brooder house but air draught should be prevented.

- (j) All night light should be used with 1 hour darkness a day.
- (k) The pullet chicks should be debeaked during 3-4 weeks of age and again at 18 weeks of age.
- (l) Provide adequate hover space, water space and feeder space (Table 1).

### **Grower Management**

- (a) **Replacement pullets upto 20 weeks of age**
  - (i) Remove under-developed, unhealthy and undesirable pullets as early as possible.
  - (ii) Separate the cockerels if any and sell them for table purpose.
  - (iii) Avoid overcrowding, provide adequate floor space, feed space and water space (Table 1).
  - (iv) In order to avoid feed wastage, feeders should never be kept more than 1/2 full. Keep the height of feeder about 2.5 cm higher than the back of birds. This will avoid feed wastage due to beaking out of feed from the feeders.
  - (v) No extra light is required. Only natural day light is sufficient.
  - (vi) Place nest-boxes at least one month before the start of lay.

### **(b) Broiler**

- (i) Debeaking is not necessary.
- (ii) Keep the litter dry and watch for the incidence of coccidiosis infection.
- (iii) Provide all night light.
- (iv) Dispose off the broilers before 8 weeks.
- (v) Avoid overcrowding.

### **Management of Layers**

- (i) Provide 14 hrs of light in layer house. From 20 weeks of age, increase 10 minutes of light every week till 16 hrs of day light is



reached. A 40 watt bulb, if hanged at the height of 7 feet, will be sufficient for 200 sq. ft. floor space. The distribution of bulb in the shed should be uniform.

- (ii) Provide sufficient floor space, feeder space and water space (Table 1).

**Table 1. Floor space, feeder space and water space requirements for various categories of birds**

Category of birds	Floor space per bird (sq. ft.)	Feeder space (inch)	Water space (inch)
<b>A. Broiler type</b>			
0-3 weeks	0.25 to 0.5	1-2	0.5
3-6 weeks	0.5 to 1.0	2-3	1.0
6-8 weeks	1.0 to 1.5	4-5	2.0
<b>B. Layer type</b>			
0-4 weeks	0.25 to 0.5	1-2	0.5
4-8 weeks	0.5 to 1.0	2-3	1.0
8-12 weeks	1.0 to 1.5	3-4	2.0
12 and above weeks	1.5 to 2.5	4-5	3.0

Hover space=10 sq. inch per chick.

- (iii) Keep the litter dry. Rack it at least twice a week. Remove wet litter and replace it by dry one. The depth of litter should be 6-8".
- (iv) Cull the weakling, non-layers and poor and sell them for meat purpose.
- (v) Collect the eggs from the shed 3 to 4 times daily.
- (vi) Protect the birds from extreme cold and hot.
- (vii) Maintain proper hygienic conditions in the shed. Follow rat killing programme carefully.
- (viii) Deworm the birds regularly. Dusting of birds should be done if there is problem of ticks and lice.
- (ix) Ensure supply of wholesome water. Clean the waterer daily. Don't fill the feeder more than half.
- (x) Pack the eggs in filler flats and store them in well ventilated room.

## ECONOMICAL FEEDING OF BIRDS

1. Feed must have all essential amino acids in proper proportion for efficient performance of birds. The deficiency of lysine and methionine should be made up by supplementation of ration with synthetic amino acids in poultry ration.
2. Maize is a costly feed ingredient and can be replaced by sorghum/ bajra/ broken wheat depending on cost. Help of experts of Deptt. of Animal Nutrition in COASci. will be readily available for formulation of cheap balanced rations.
3. Feed samples can be got analysed from the Deptt. of Animal Nutrition for their nutrient content and from Deptt. of Vety. Public Health for their aflatoxin content.

## MANAGEMENT OF BIRDS DURING STRESS CONDITIONS

Following types of stress conditions are possible at a poultry farm. Their correction measures are described below :

- A. Birds perform best during spring like conditions. During hot summer, stress can be minimised by following measures :
  1. Poultry sheds should be constructed in East-West direction to prevent direct sun light.
  2. Roof of sheds (asbestos) should be painted with white paint to reflect the sun light.
  3. Roof of sheds may be covered with bedding material like paddy straw and water can be sprinkled over it.
  4. Sheds can be covered with gunny bags after providing appropriate space for air circulation and then water can be sprinkled over them.
  5. Water can be sprayed on the exterior of the roof in droplets or even by fogging in the interior to reduce the heat.
  6. Cooling through sprinkling is useful only until the indoor relative humidity reaches 70 to 75%. Following this an increase in air velocity would be the last means available for cooling on a large scale other than air conditioning.



7. Artificial air circulation can be provided by using electric fans or air circulators if the temperature of shed is below body temperature.
  8. Outside the sheds, green trees and lawns will reduce the heat stress.
  9. Use earthen waterer (Pitcher and Kunal) during summer.
  10. Feed should be supplied during cooler part of the day by providing extra light at early morning and evening hours.
  11. It is advisable to provide more concentrated diet. The diet may be supplemented with vitamin C.
  12. Handling during summer should be minimum. Frequency of collection of eggs should be increased.
- B. To reduce the cold-stress following measures should be followed :
1. During cold minimum ventilation rate should be there but minimum oxygen entry and removal of carbondioxide and ammonia must be maintained.
  2. Check for ammonia smell at morning hours when you open the shed.
  3. Suffocation should be avoided while heating the sheds with local available means.
  4. The use of warm drinking water is helpful during cold.
  5. The energy content in the ration should be increased.
  6. Peck order should not be disturbed frequently by mixing birds from different flock/pens.
  7. Handling and transportation should be avoided during extreme weather conditions.
  8. Sudden change in routine practices like change of feed or feeding schedule, lighting, attendant should be avoided. If necessary, make it gradually.
  9. Vaccination stress should be avoided.



10. Physical disturbances like noises, slamming a door, visits of strangers or improper handling should be avoided as far as possible.

#### A. Important Viral Diseases of Poultry

(a) **Gumboro disease** : It is a viral disease affecting the layer and broiler chicks generally at the ages between 3 and 12 weeks. The chicks become dull, depressed and off-feed. Mortality depends upon the vaccination status of the chicks. In the unvaccinated chicks, mortality is up to 50 to 70%, and in the vaccinated chicks between 2 to 10%. Important postmortem lesions are severe haemorrhages on breast and thigh muscles. In the early stages, the bursa is enlarged, oedematous and with haemorrhages, later on, it atrophies. Haemorrhages are also seen in the proventriculus. Sometimes, mortality increases and continues due to secondary complications like gangrenous dermatitis, CRD or coccidiosis. During the disease outbreak, there is no use of vaccinating the flock. However, the unvaccinated birds may be vaccinated with killed vaccine. The birds are to be supplemented with vitamins, liver tonic and milk powder. If secondary complications arise, treatment is to be done accordingly.

**Prevention** : A single vaccination may not control the disease properly. Therefore, double vaccination is advised, the first at 13th to 14th days of age and the second at the 4th week of age. In endemic areas Gumboro killed vaccine @ 0.2 ml/chick is given along with the 1st vaccination.

(b) **Ranikhet disease** : It affects birds of all age groups. Mortality depends on the levels of antibodies. In the unvaccinated flocks, mortality can go up to 70 to 80%, whereas in the vaccinated flocks, depending upon the antibody status of the birds, it can vary between 2 to 10%. The important symptoms are that of whistling sounds, greenish diarrhoea and death. The diagnostic lesions are haemorrhages in the proventriculus and haemorrhagic ulcers in the Payer's patches of the intestines. Sometimes, in the early stages, no haemorrhages are seen in the laying birds; only milky fluid is seen in the intestines. At the time of the outbreak, it is advised to administer Lasota vaccine in water along with R<sub>2</sub> B vaccination. Sometimes R<sub>2</sub> B killed vaccine @ 0.5 ml/adult bird and 0.2 ml/chick is also advised for the affected flock.

Recently it has been seen that where the concentration of layer birds or broilers is more in a particular belt, the routine vaccinations are



not giving the proper protection. At some places even the double R<sub>2</sub> B vaccination has failed. In such pockets the following vaccination procedure has protected the birds properly.

- (i) F<sub>1</sub>/Lasota at 5th day by I/nasal or I/ocular route.
- (ii) Lasota at the 6th week in the water.
- (iii) R<sub>2</sub>B attenuated at 8th week by injection in the wings.
- (iv) R<sub>2</sub>B killed at 16th week by S/C route in the neck region.

(c) **Marek's disease** : The chicks are infected in the 1st week of their life. However, due to the long incubation period of the disease the clinical symptoms are manifested in the chicks generally between 12 to 16 weeks of age depending upon the virulence of virus. The clinical symptoms in the chickens are lameness if nerves of the birds are affected and if there are tumors in the visceral organs then the birds die suddenly without showing any lameness.

In the dead birds either there is oedematous enlargement of various nerves, particularly in the brachial and sciatic plexuses or tumors in the various organs such as proventriculus, liver, spleen, kidneys and ovary.

Recently it has been seen that inspite of vaccination of day old chicks, the incidence of the disease is increasing and sometimes the mortality upto 10 to 15% occurs.

Repeating the vaccine either at one day of age or at 20 days of age as being advised in the field has not shown any consistent result. There can be so many causes for the failure of vaccine such as : (i) The virus has become more virulent and the present vaccine (HVT) is not giving proper protection. (ii) Early exposure of the chicks to MD virus at the farm. The virus enters in the chicks and establishes itself before the protective level of antibodies are reached in the chick. (iii) Immune system of the chicks is damaged due to various mycotoxins present in the feed, due to various viral diseases particularly Gumboro disease or if the chicks are reared under stress conditions particularly if higher level of ammonia gas is present in the sheds. (iv) Human errors during the vaccination.

In the present circumstances it is advised that (i) Brooding of the chicks should be done away from the main farm at least for 1st 15 to 20 days to avoid the early exposure of chicks to MD virus. (ii)



Chicks should be reared under healthy conditions i. e. proper ventilation and proper space, so that ammonia gas is not formed in the sheds. (iii) The chicks should be protected against those diseases which affect the immune system of the birds, by proper vaccination and by giving good quality feed. (iv) To avoid human errors in vaccination, the vaccine can be repeated in day old chicks when the chicks come at the farm.

The most important point is that studies in the laboratories are to be carried out to ascertain whether the virulence of the virus has increased and the vaccine being used is giving proper protection or not. If so then the bivalent vaccine should be introduced as being done in other countries and giving excellent results.

## **B. Important Bacterial Diseases of Poultry**

(a) **Fowl typhoid.** It is a very important disease of broiler parent birds and broiler chicks caused by *Salmonella gallinarum*. The disease affects the parent flock generally during laying stage causing mortality in them. But the most serious concern about this disease is that it is transmitted vertically from the parent birds to their chicks causing heavy mortality in chicks in their first two weeks of life. The important postmortem lesions in the adult parent birds are enlargement of the liver and spleen with liver giving greenish bronze tinge. Sometimes necrotic foci on the liver are observed.

In the chicks, the liver is enlarged having slight greenish coloration and spleen is also enlarged (2 to 3 times of normal) and haemorrhagic. Sometimes haemorrhages are seen in the caeca just like caecal coccidiosis. In chronic cases necrotic nodules develop on the heart and ulcers in the intestine and caeca.

**Treatments :** In the parent flocks the disease is being controlled by giving Gentamycin inj's and also gentamycin injected chicks are being supplied to the farmers.

(b) **Colibacillosis :** It is another important bacterial disease caused by *Escherichia coli*. *E. coli* is normal inhabitant in the birds. When the birds, particularly layer birds during peak production come under stress condition such as heavy works, bad quality feed, severe heat or cold or chronic Coccidiosis etc. then the bacteria start multiplying in the body of the birds and cause the disease called Colibacillosis or *E. coli* infection (popularly known in the field). The layer birds become dull,



depressed and off feed, combs become bluish and shrivelled and mortality occurs. On post mortem examination the ova are found to be misshapen and flaccid.

**Treatment :** Any broad spectrum antibiotic based on sensitivity test for the culture can be given. Before starting the treatment, predisposing cause of the *E. coli* infection should be diagnosed and should also be removed/treated.

(c) **CRD :** It is an important disease of broilers and chicks and also some times of adult layers in peak production. It is caused by mixed infection of *E. coli* bacteria and *Mycoplasma*. Both the organisms are normally present in the birds. Whenever the broiler or layer chicks are subjected to any stress condition particularly high level of ammonia gas in the sheds due to overcrowding, wet litter and tightly closed windows this disease develops in the chicks. Clinically chicks will show symptoms of respiratory distress and postmortem examination will reveal caseous exudate in airsacs and in advance conditions fibrinous pericarditis and hepatitis.

**Treatment :** Broad spectrum antibiotic based on sensitivity test mixed with any antimycoplasma drug such as Tylosin, Tiamutin, Lincospectin can be used. Sometimes one injection of Terramycin L A. @ 0.2 ml/chick controls the disease.

When this disease starts appearing in every broiler flock then infected sheds should be cleaned & kept vacant for at least one month.

(d) **Brooder Pneumonia :** It is an important fungal disease of young chicks caused by *Aspergillus fumigatus*. The disease affects mostly chicks kept in the brooder in the age group of one to two weeks. Generally the chicks get this fungal infection either from brooders/hatchers in the hatchery itself or from the litter particularly saw dust. Sometimes if the sheds are kept tightly closed for sometimes before the arrival of the chicks then also this fungus develops in the sheds causing infection in the chicks. The affected chicks start going weak emaciated, stand in the corners with nodding of heads and some show symptoms of respiratory distress.

Postmortem examination will reveal caseous nodules in the lungs and airsacs.

**Treatment :** There is no proper treatment. Antifungal drugs like Haymycin can be given. Copper sulphate (in feed/spray in sheds



has been used. However, drugs do not control the disease properly. Prevention is the best way to control the disease like proper ventilation of the sheds, avoid using saw dust, and moisture sheds should remain open for 5 to 10 days before the arrival of chicks.

## **NUTRITIONAL DISORDERS IN POULTRY, ITS CAUSES AND PREVENTION**

Raising poultry successfully demands adequate nutrition, proper management and disease control measures. Vitamins comprise an essential ingredient of nutrition. Deficiency of various vitamins in the ration often amounts to retarded growth, lower egg production, poor hatchability and varying degree of mortalities in the affected flocks.

Essential mineral elements are as important as vitamins in maintenance of life, well being and production in poultry. They enter into composition of bones and give the skeleton the rigidity and strength needed to support the soft tissues. They take part in maintenance of osmotic pressure and acid-base balance and exert specific effects on the ability of muscles and nerves to respond to stimuli. Minerals also are necessary for activation of many enzymes of the body.

### **I. Vitamins**

All the known vitamins except vitamin C are essential for normal health in poultry. In the event of deficiency of certain vitamins in the feed the affected birds develop signs and symptoms.

#### **A. Fat Soluble Vitamins**

##### **(i) Vitamin A deficiency (Avitaminosis-A)**

It is essential for growth, vision, protection against infection and normal functioning of mucous membranes of body. Vit-A deficient chicks are more susceptible to respiratory and other infections.

**Clinical signs :** As a result of deficiency of vit. A young chicks show retarded growth, ruffled feathers, incoordination, staggering gait, loss of yellow pigment from shank & beaks, watery discharge from eyes and accumulation of cheesy material under eyes with high mortality.

**In adult birds :** The signs of vit. A deficiency include sharp decline in egg production, conjunctivitis, watery oculonasal discharge, and sticking together of eyelids due to accumulating cheesy material.



**Gross lesions :** Small whitish pustules in nasal passage, mouth, pharynx oesophagus and upto crop are observed. Kidneys are pale with increased urates in ureter. Sometime urates may be present on serous membrane.

**Source :** The natural sources of vit A are barseem, legumes, alfalfa, grasses, fishoil, yellow corn and palm oil. Vitamin A gets destroyed when the feed is stored for a long time, so the use of very old stored feed should be avoided. The ingredients like maize, which are rich in Vitamin A should not be replaced by wheat and rice cuttings.

**Treatment :** Poultry flock found to be severely deficient in vitamin A should be given a stablized vitamin A preparation at a level of approximately 10000 International Unit vitamin A/kg ration.

#### (ii) Vitamin D deficiency (Avitaminosis D)

Required for proper metabolism of calcium and phosphorus. Its deficiency causes defective absorption and assimilation of calcium leading to rickets and soft bony skeleton, soft beaks and claws and soft egg shells.

**Source :** The natural source is fish oil and exposure to sun light.

**Clinical signs :** In chicks, bones, beak and claws become soft and pliable. Due to weakness of legs, chicks sit on their hocks and sway slightly from side to side. Sternum is curved and keel bone is wavy. Inward curvature of ribs with well developed nobes on the inner surface of ribs at costochondrial junction (ricket rosey) is seen. Spinal column bends downward.

**Adult :** Eggs laid are thin shelled and soft shelled or shell less. Leg weakness and other skeletal abnormalities also develop.

**Treatment :** Feeding a single massive dose of 15,000 International unit of Vitamin D<sub>3</sub> cured rachitic chicks more promptly than when generous level of the vitamin were added to feed.

#### (iii) Vitamin E deficiency

This Vitamin is required for the normal functioning of central nervous system, body musculature and reproduction. The ingredients



which are rich in Vitamin E are cotton seed oil, peanut oil, wheat germ and soyabean oil. The use of badly stored feed should be avoided as the Vitamin E gets destroyed.

The deficiency causes three distinct syndromes in chicks.

(i) **Encephalomalacia (Crazy chick disease)** : Seen in chicks from 2-4 weeks age upto 8 weeks. There is ataxia, backward or downward movement of head, rapid movements of legs and incoordination.

**Lesions** : Cerebellum is softened and meninges are swollen & edematous. Minute haemorrhages in cerebellum are seen which are visible on surface and its convolutions are flattened.

(ii) **Exudative diathesis** : It is associated with selenium deficiency. Mostly seen in 2-8 week old chicks. There is oedema of S/c tissues. The greenish-blue viscous fluid is seen through skin throughout the breast, leg muscles and intestinal wall. Chicks stand with their legs apart due to fluid accumulation, pericardium is distended and may cause sudden death.

(iii) **Muscular dystrophy** : Chicks about 4 weeks of age mostly affected. The condition accompanied with sulphur amino acid deficiency. It is characterised by light coloured streaks of degeneration in breast and other skeletal muscles as well as muscles of heart and gizzard.

**Treatment** : If the disease is not too far advanced, exudative diathesis and muscular dystrophy in chicks are readily reversed by administration of proper levels of vitamin E (100 IU/kg) and selenium (0.1 ppm as  $\text{Na}_2\text{SeO}_3$ -Sodium Selenite) by injection, or by oral dosing or administration through feed.

#### (iv) **Vitamin K deficiency**

It has important role in coagulation of blood through synthesis of prothrombin. Its deficiency results in prolonged clotting time and affected birds may bleed to death from a minor injury. It leads to large haemorrhages on the breast, legs, wing and/or abdominal cavity, chicks show anaemia.

**Treatment** : Within 4-6 hr. after vitamin K is administered to deficient chicks, blood clots normally but recovery from anemia or disappearance of haemorrhages cannot be expected to take place promptly.



## **B. Water Soluble Vitamins**

### **(i) Thiamine (B1 deficiency)**

**Source:** The grains especially the oil cake meal are rich in Vitamin B1.

**Signs**=Chicks suffering from B1 deficiency show typical star-gazing posture. Occurs under 2 weeks of age. There is a paralysis of anterior cervical flexor muscles so the head is retracted backward and stargazing posture is named. The muscles of the legs and wings are also affected. The paralysis starts with the toes and extends upwards, bird loses ability to stand or sit, therefore lies down with its head retracted.

**Treatment of deficiency:** Chickens suffering from thiamin deficiency respond in a matter of a few hours to oral administration of the vitamin.

### **(ii) Riboflavin Vitamin B2**

Sources are milk, fresh green, alfalfa and yeast.

**Symptoms:** Diarrhoea, curly toe paralysis, decreased egg production & heavy embryonic mortality.

**Pantothenic acid and Biotin (Exfoliating dermatitis):** Peanut meal, yeast, liver meal, rice bran and molasses are natural sources of pantothenic acid and sources of biotin are molasses, gram, grain products and alfalfa.

The deficiency of both of these vitamins results in scaling of skin, retarded growth, broken feathers and slow mortality. Small scaly scabs are seen around the eyelids and mouth. The eyelids appear stuck together, cracks and fissures are observed between the toes.

### **(iii) Nicotinic acid (Niacin)**

Deficiency causes enlarged hock joints but the tendon of achilles rarely slips. There is inflammation of the tongue and mouth (Black tongue).

### **(iv) Pyridoxine (B6)**

Symptoms of B6 deficiency are spasmodic convulsion and chick runs aimlessly with flapping of wings.

#### (v) Choline deficiency

Symptoms are similar to the niacin deficiency. Besides poor growth perosis is outstanding symptom. Turkeys have more requirement therefore severe perosis is seen.

Perosis occurs as puffiness of joints and meta tarsus gets twisted, bend or bowed so out of alignment with tibial articular cartilage is deformed and gastrocnemius tendons gets slipped. In laying broilers, fatty liver is rare in those fed choline. If sufficient folic acid is present in diet then small amount of choline is required to prevent fatty change in liver. When diet is deficient in folic acid very high choline is required.

#### (vi) Folic acid deficiency

Causes straight neck paralysis in turkeys.

#### (vii) Cyanocobalamin

It is known as "Antipernicious anaemia factor". It contains cobalt. Due to deficiency there is anaemia and blood spots occur in the eggs.

The required nutritional level of various vitamins in poultry feed/water

Vitamin	Name of the product	Nutritional level for supplementation	Under stress conditions	Mode of administration
1	2	3	4	5
Vitamin A	Vitablend WM Forte	2 ml/100 birds	5 ml/100 birds	Drinking water
Vitamin A & D	Rovisol AD <sub>3</sub> Type, 100	5-10 ml/100 birds (Chicks) 12.5 ml/100 birds (Layers)	15 ml/100 birds (Chicks) 15-20 ml/100 birds (Layers)	-do-
Vitamin A, D <sub>3</sub> , E and B <sub>12</sub>	Vimeral	5 ml/100 birds	10 ml/100 birds	-do-



1	2	3	4	5
Vitamin A, D <sub>3</sub> , E and C	Rovisol AD <sub>3</sub> EC	10-15 ml/100 birds (Chicks) 25 ml/100 (Layers)	20 ml/100 birds	-do-
Vitamin A, B <sub>2</sub> and D <sub>3</sub>	Vitablend A, B <sub>2</sub> , D <sub>3</sub>	200 gms/Tonne Poultry feed	—	Mix in feed
Vitamin A and D <sub>3</sub>	Vitablend AD <sub>3</sub> Forte	25 gms/Tonne of Poultry feed	—	-do-
B-Complex	Complex-B-Glaxo	15-20 ml/100 birds	100 ml/100 birds	Drinking water
Vitamin B <sub>1</sub> B <sub>6</sub> B <sub>12</sub> , Niacin, Calcium Panto the-nate and Vitamin E	Rovibe	200 gms/Tonne of feed	—	Mix in feed

## II. Mineral Deficiencies

### (i) Calcium phosphorus deficiency

These minerals are necessary for bone formation. The ratio of 2 : 1 calcium and phosphorus is required in diet & blood. Deficiency is related to Vitamin D. Rickets "Rachitic rosary" lesions.

### (ii) Manganese deficiency

Causes low hatchability, chondro dystrophy, thick legs, short wings, parrot beak, globular head and perosis.

In chicks ataxia is produced when excited. Head is drawn forward and bend underneath or retracted over back. Ataxia is permanent and bones are short.

### (iii) Zinc deficiency

Deficiency signs include retarded growth, poor feathering; enlarged hocks; short, thickened long bones; scaling of the skin and dermatitis, particularly on the feet; and an awkward arthritic gait.

Chickens maintained on a Zn-deficient diet are unable to produce antibodies against T-cell-dependent antigens even though lymphocytes are capable of immunoglobulin production.

(iv) **Selenium deficiency**

Selenium deficiency has been covered under exudative diathesis.

(v) **Magnesium deficiency**

Magnesium (Mg) is closely associated with Ca and P in the body. It is essential for bone formation. About two-third being present in bone chiefly as a carbonate. It is also necessary for carbohydrate metabolism and for activation of many enzymes. Egg shells contain about 0.4% Mg.

Mg. requirement of chicks is approximately 0.04% of the ration during the first few weeks of life. Chicks fed Mg. deficient diet grow slowly for approximately 1 wk and then cease growing and become lethargic. When disturbed these chicks frequently passed into a brief convulsions.



## APPENDIX 1

### Addresses of some important hatcheries

1. Kegg Farms Private Limited  
Production, Farm and Hatchery Div.  
B-15/A, DLF Colony, Gurgaon.
2. Goldie Hisex Farms Private Limited  
Deepalpur Road, Tehsil Bahalgarh  
Distt. Sonapat.
3. Central Poultry Breeding Farm, GOI  
Industrial Area  
Chandigarh-160 002.
4. Essex Farms Private Limited  
4, Aurobindo Marg  
New Delhi-110 006.
5. Hi-Bred (India) Private Limited  
D-125, Defence Colony  
New Delhi-110 024.
6. Poona Pearls Poultry Breeding Farm and Hatcheries  
201, Vikram Tower  
16, Rajendra Place  
Pusa Road, New Delhi-110 008.
7. Ranishaver Poultry Breeding Farms Pvt. Ltd.  
3. Shopping Centre,  
West End, New Delhi-110 021.
8. Universal Poultry Breeding Farm  
1/2780, Kashmere gate  
Delhi-110 006.

## APPENDIX 2

Abstract of fourteenth random sample test for egg production 1991-92 conducted at random sample poultry performance testing centre, Bombay

Name of entrant	Hen housed egg prod.	Hen-day egg prod.	Feed used per doz egg (kg)	Feed consumed per day bird (gm)	Av. egg weight (gm)	Margin of receipt by sale of eggs, birds and litter over total feed cost per bird (Rs.)
1. M/s Venkateshwara Research and Breeding Farm Ltd. 13/6, Mile Stone Pune-411 025	249.378	258.258	2.685	99.2	56.67	(+) 29.50
2. M/s Kegg Farm Ltd. Jaipur Road, Village Khandsa, Gurgaon	220.126	236.038	3.183	102.5	56.49	(+) 3.66



# APPENDIX 3

Abstract of the fifteenth random sample test for broiler production (November, 1992 to January, 1993) conducted at random sample poultry performance testing centre, Bombay

Name	Feed consumption per chick upto		Av. live weight per chick		Feed consumption per kg gain in live weight		Margin of receipt by sale of broilers over feed cost per broiler	
	6 wk. (kg)	7 wk. (kg)	6 wk. (kg)	7 wk. (kg)	6 wk. (kg)	7 wk. (kg)	6 wk. (Rs.)	7 wk. (Rs.)
1. Prof. & Head Deptt. of Animal Breeding CCSHAU, Hisar	3.149	4.027	1.040	1.183	3.028	3.404 (+)	5.15 (+)	3.42
2. Director, Central Poultry Breeding Farm, Industrial Area, Chandigarh	2.907	3.845	1.023	1.250	2.842	3.076 (+)	6.19 (+)	6.03
3. M/s Tarkeswara Hatcherers Pvt. Ltd. "Ayodhiya" Plot No. 156/157, Shivagiri Colony, H.P.T. College Road, Nasik-422 005	3.140	4.211	1.465	1.827	2.522	2.600 (+)	14.90 (+)	16.74

## APPENDIX 4

### Addresses from where vaccines can be procured

1. Head, Division of Biological Products.  
I. V. R. I., Izatnagar, Bareilly (U. P.).
2. Joint Director, Haryana Veterinary Vaccine Institute, Hisar.
3. Srini Biological Laboratories Pvt. Ltd.,  
13/6, Milestone, P. O. Giri Nagar, Pune-411 025 (Maharashtra).
4. Bio-Med Pvt. Ltd., C-96, Site No. 1, Bul. Rd. Ind. Area,  
Ghaziabad-201 001 (U. P.).
5. BAlF Laboratories Ltd., Briahnagar, Pune-Nagar Road, Wagholi-  
412 207, Distt. Pune (Maharashtra).
6. Hoechst India Ltd., Hoechst House, Nariman Point, Bombay-  
400 021 (Maharashtra).
7. Indian Immunologicals, 11-4-657, Lakdi-Ka-Pul,  
Hyderabad-500 004 (A. P.).



## Vaccination schedule of important diseases of poultry

Disease	Vaccine, dose & route***	Remarks
<b>(a) For Broilers</b>		
(i) Marek's disease**	M. D. vaccine @ 0.2 ml S/C on 1st day (at hatchery).	Postpone vaccination when there is concurrent disease in the flock, till it recovers. Avoid stress on birds. Vaccinations should be carried out preferably either in early morning hours or in the evening.
(ii) Ranikhet*	F1 strain 1-2 drops intraocularly/intra-nasally Lasota in drinking water on 5th day of life. May repeat during 5th week in endemic areas.	
<b>(b) For Layers</b>		
(i) Marek's disease**	M. D. vaccine @ 0.2 ml S/C day old at hatchery.	Vaccine should always be stored at low temperature.
(ii) Ranikhet*	F1 strain 1-2 ml I/O day old/at 1st week of life. F1 strain or Lasota in drinking water at 4th week. R <sub>2</sub> B 0.5 ml S/C at 7th week of age. R <sub>2</sub> B 0.5 ml S/C at 16-22nd week.	
(iii) Fowl pox**	F. P. vaccine, wing web inoculation at 8-10 week of age.	
(iv) Gumboro disease	I. B. D. vaccine in drinking water at 3 weeks and repeat at 5th week.	
(v) Infectious bronchitis (I. B.)**	I. B. Massachusetts strain 2 drops intranasally at 4-6 weeks of age. May repeat at 10-12 weeks.	

\*Deputy Director, Haryana Vety. Vaccine Institute, Hisar.

\*\*Srini Biological Laboratories Pvt. Ltd., 13/6 Milestone, P. O. Girinagar, Pune-411 025 (from chemist).

\*\* (ii) Bio Med. Pvt. Ltd., C. 96, Site No, 1, Bul Rd. Ind. Area, Ghaziabad-201001 (from chemist).

\*\*\*It is advisable to strictly follow the instructions, of manufacturer of vaccine.

## **Precautions to be taken during vaccination**

- (i) Follow instructions of the manufacturer.
- (ii) Proper storage of the vaccine at the recommended temperature.
- (iii) Vaccination at a proper age and re-vaccination as recommended.
- (iv) No concurrent infection at the time of vaccination.
- (v) Use of proper diluent at a recommended temperature.
- (vi) Proper dose and regime of the vaccine.
- (vii) Proper sterilization of syringes, needles etc.
- (viii) Use of feed free from aflatoxins, particularly in poultry.
- (ix) Use of reconstituted vaccine within a prescribed period at a suitable temperature.
- (x) Avoid the simultaneous use of immuno-suppressant drugs.
- (xi) Good management, nutrition and sanitary conditions.

## **Prevention of Poultry Diseases**

1. Infections in poultry flocks may spread from sick to healthy birds through the carriers, direct contact, intermediate host, contaminated soil, litter, feed, water and even air. Infection may also spread mechanically from attendants, visitors shoes or clothes, movable equipments debeakers, crates, feeders, waterers, feed bags, etc. and through rodents, wild birds and insects. A sound knowledge of the mode of spread of infections is essential for instituting effective preventive measures to break the cycle of infections.

2. The following precautions may be helpful to avoid the spread of infections.

- (i) Keep only one species of birds on a farm.
- (ii) Start the farm from day old chicks.
- (iii) Avoid entrance of visitors on the farm as far as possible. Unavoidable visitors may be dressed with disinfected cover.
- (iv) Take proper sanitary measures to avoid spread of infections through soil, litter, feed, water feeder, waterer, feed bags and even air.



- (v) Keep away rodents, wild birds and insects from the poultry farm.

3. Avoid building up of infections. It is not possible to keep the birds completely free from any kind of infection. These infections start building up where stress/unfavourable conditions prevail. Following steps must be taken to prevent building up of infections on a poultry farm.

- (i) Keeping the poultry shed in dry conditions.
- (ii) Do not mix the birds of different groups.
- (iii) Avoid mixing of litter in feed and water by placing the feeder and waterer on raised platforms. Waterers should be cleaned daily.
- (iv) Replace the litter with every new batch of chicks.
- (v) Cleaning and disinfection of poultry houses particularly breeder house should be a routine.
- (vi) Segregate sick birds and dispose off dead birds in a fly-proof disposal pit.
- (vii) Follow a proper prophylactic vaccination programme.

The presence of mould toxins is potentially the most serious quality problem, which is faced by producers, manufacturers and handlers of food and feed products. Various toxigenic fungi are widely distributed in standing crops and stored feeds. The secondary metabolites produced by these fungi are termed as mycotoxins.

### **Aflatoxicosis in Poultry**

Aflatoxicosis is the name given to mycotoxic condition caused by aflatoxin produced mainly from *Aspergillus flavus* and *Aspergillus parasiticus*. They affect mainly feeds and feed ingredients like corn, rice, wheat, nuts, soyabean, sunflower and cotton seeds, etc. The condition came into light when heavy mortality in turkey poults occurred in England in 1960. The condition at that time was termed as turkey 'X' disease. Because of isolation of *Aspergillus flavus* from the moulds, which was responsible for the mortality, it was given the name Aflatoxin (A stands for *Aspergillus* and fla stands for *flavus*).



Mycotoxins, though worldwide in distribution, are of special significance in developing countries like India because of natural climatic conditions like humid and temperature/climate, sudden and heavy rainfall at some places and natural calamities like floods in some areas; unsatisfactory, improper and inadequate pre and post harvest as well as pre and post storage conditions, which favour mould growth and in turn, promote production of toxins in various feed ingredients.

Aflatoxins are classified mainly in four groups viz., B<sub>1</sub>, B<sub>2</sub>, G<sub>1</sub> and G<sub>2</sub>. Aflatoxins B<sub>1</sub> and B<sub>2</sub> impart blue fluorescence under U. V. light, whereas G<sub>1</sub> and G<sub>2</sub> impart yellow-green fluorescence under U. V. light. The Rf value of these aflatoxins is in descending order. Out of these aflatoxins, B<sub>1</sub> is considered to be most toxic, which is carcinogenic, mutagenic, teratogenic and immunosuppressive.

Aflatoxin can be produced in the crops while growing in the field and also during harvesting, storage, processing/mixing, transportation seed/grains as well as during the period of feeding. The production of aflatoxin is rapid when the moisture content is more than 15%, temperature is about 24° and relative humidity is more than 80%. Kacha and damp floor as well as improper ventilation favour the production of aflatoxin.

The main symptoms produced are lethargy, listlessness, loss of appetite, decreased feed efficiency, closing of eyes, opisthotonus, spasm of the neck muscles, arched back and legs stretched posteriorly. There is retardation of growth in growing birds and drop in egg production in layers. The hatchability is also poor. The birds become more susceptible to other infections and there is immunity breakdown.

The lesions observed at postmortem include necrosis and proliferation of hepatocytes, bile duct proliferation, hepato-cellular carcinoma, subcutaneous haemorrhages and petechial haemorrhages on pancreas and serous membranes, regression of bursa of fabricius, congestion of myocardium, distention of gall bladder and pericardial sac, catarrhal inflammation of intestine and kidney disorders.

### **Preventive and Control Measures**

Addition of antifungal compounds, apart from reducing the moisture content and proper storage of feed ingredients is beneficial to prevent the growth of the fungus. Among the various antifungal



compounds, most commonly sorbic acid, propionic acid, benzoic acid, acetic acid and their salts and gentian violet are used to prevent the growth of fungus.

In general, aflatoxins are not sensitive to heat, pelleting and other processing conditions. However, under high acidic conditions (pH less than 3.5) and high alkaline conditions (pH more than 10.0) aflatoxins concentrations can be reduced. Solvent extracted oil cakes contain relatively less aflatoxins as compared to the expeller oil cakes.

If aflatoxins are present at higher concentration in feed ingredients and feeds, blend down the concentration with good feed material so that the final concentration of aflatoxins is within the permissible limit.

Another method of avoiding aflatoxicosis is to detoxify the aflatoxins by ammoniation. The ammonia reacts with the moisture leading highly alkaline nature that changes the aflatoxin structure to a non-toxic form. Unfortunately, this method is not practicable and is expensive.

Use of aluminosilicate and other chemical compounds which will bind the aflatoxins present in the contaminated feed materials.

By increasing the dietary protein/methionine content in the diet.

By increasing fat soluble vitamins A, D, E, K and B-complex vitamins in the diet.

In case of groundnut cake, exposure to sunlight for 1 to 2 days reduces aflatoxins to a considerable extent.

### **Safe Level of Aflatoxin in Poultry Feed**

No safe level for poultry feeds has been fixed officially in India. Food and Drug Administration has set a maximum allowable level of aflatoxin at 20 ppb (0.02 ppm) in the poultry feeds. This has also been accepted as safe level for poultry by European Economic Community. Protein Advisory Group has recommended 30 ppb as maximum permissible limit for poultry feed. Thus, 30 ppb is considered to be workable maximum permissible limit for poultry feed.

## Occurrence of aflatoxin in compound poultry feeds and precautionary measures to be taken for proper storage

A study was undertaken to examine the extent of aflatoxin contamination in compounded feeds in Haryana and to observe the effect of different environmental factors on its production during storage.

Table showing effect of different storage factors on aflatoxin levels in feed samples

Character		Mean aflatoxin (A) content (ppb)
Period of storage (days) (S)	1-10	291.70 (142)
	11-20	557.47 (78)
	21-30	827.55 (14)
	31-40	908.28 (6)
Temperature (°C) (T)	19-21	596.18 (9)
	22-24	840.06 (124)
	25-27	809.81 (33)
	28-30	658.67 (12)
	31-33	588.43 (25)
	34-36	528.35 (21)
Humidity (%) (H)	37-39	502.25 (16)
	56-60	350.42 (25)
	61-65	580.65 (98)
	66-70	698.18 (89)
	71-75	793.25 (16)
Floor condition (F)	76-80	808.75 (12)
	Pucca	528.76 (196)
	Kacha	863.74 (44)
Ventilation (V)	Ventilated	564.42 (167)
	Unventilated	728.08 (73)

Figures in parentheses indicate number of samples in each category.

Feeds stored up to 10 days had aflatoxin level of 291.70 ppb which increased to 908.28 ppb with more than 30 days storage. Aflatoxin production was directly proportional to the duration of storage.



Maximum amount of aflatoxin (840.06 ppb) was detected in feed samples stored in rooms having temperature range of 22°-24°C. When the feed samples were stored for less or more than 10 days at temperature less than 25°C aflatoxin levels were more as compared to the samples which were stored for less or more than 10 days at temperature higher than 25°C. It indicated that more amount of aflatoxin was produced at low temperature as also reported by Surekha and Reddy (1989).

Maximum toxin production occurred between humidity range of 76-80%. The toxin levels were more than 10 days at higher humidity level (i. e. above 65%) as compared to the samples stored for less number of days alongwith less humidity (less than 65%).

Kacha floors in storage rooms were more conducive for greater aflatoxin elaboration (863.74 ppb) than pucca floors (528.76 ppb). The levels of aflatoxins were more when the feed was stored for less or more than 10 days on kacha floor as compared to the samples stored for less or more than 10 days on pucca floor. On pucca floor, the low levels were probably due to its impervious nature which checked the dampness gaining access to the feed, restricting fungal growth. Out of 240 farms from where the feed samples were collected, the majority of storage rooms (196) were pucca floors.

Similarly, more amount of aflatoxin was detected in feeds stored in unventilated rooms (728.08 ppb) as compared to ventilated rooms (564.42 ppb). It might be because the storage room was frequently opened facilitating better ventilation.

In the light of these observations, precautionary measures may be adopted to check the development/formation of aflatoxin. They include :

- Proper drying of feeds (preferably in sunlight) before it is stored.
- The storage room should be pucca, well ventilated and less humid.



## MISCELLANEOUS DISEASES OF CAMEL AND EQUINES

### Pica in Camels

#### Introduction

Pica in camels (Mitti Khana) is prevalent in the camel populated areas of Haryana, Punjab, Uttar Pradesh and Rajasthan. Research work on this field oriented problem was started in the year 1967 in the Department of Veterinary Medicine. Till date, several thousand camels, suffering from pica, have successfully been treated free of cost as a result of which camels worth of several crores of rupees have been saved. Prior to these findings of successful treatment of pica, camels suffering from pica were used to be let loose in the jungle to die a natural death by the farmers. Several cases of pica in cattle, donkeys, sheep, goats and dogs have also been treated. It has also been observed that problem of pica in cattle/buffaloes has increased considerably due to drought conditions in the past.

Clinical investigation of camels suffering from pica have revealed that mostly the camels are heavily infested with gastrointestinal parasites.

#### Etiology

The gastrointestinal parasites revealed in camels were *Haemonchus*, *Bounostomum*, *Trichostrongylus*, *Oesophagostomum*, *Nematodirus*, *Strongyloides* and *Trichuria* spp. Haematological estimates showed low haemogrammes (haemoglobin gms%, total erythrocytic count mill/cum and packed cell volume per cent) leading to microcytic normochromic anaemia. Biochemical analysis of blood also showed low calcium (mg/100 ml) inorganic phosphorus (mg/100 ml) and total serum proteins (mg/100 ml). The buffaloes calves suffering from pica are found harbouring Ascarids while crossbred cattle gastrointestinal parasites.

#### Symptoms

Symptoms of pica affected camels were weakness and emaciation with deprived appetite. An affected camel would eat upto several kilograms of mud, earth, katcha walls, sand, stones and bricks. The habit of eating mud, earth etc. makes the camels



look like a skeleton of bones and useless for work and thus, camels were let loose in the jungle by the villagers to die a natural death.

## **Treatment**

The treatment depends upon the removal of a etiological factors and improvement in the management and feeding on highly nutritious diet. Broad spectrum anthelmintics like Banminth-I (Pyrentel tartarate of Pfizer @ 25 mg/kg B. Wt.), Banminth-II (Morental tartarate of Pfizer @ 25 mg/kg B. Wt.), Banminth-II (Morentel-citrate of Pfizer @ 5 ml/20 kg/B. Wt.), Thiabendazole (Thiazolyl-benzimidazole of Merck-Sharp and Dhome of India Ltd. @ 66 mg/kg B. Wt.). Fenbendazole (5-Phenylthio-2-benzimidazole carbamate of Hoechst @ 5 mg/kg B. Wt., marketed under the trade name of Panacur). Nilvorm (Tetramisol HCl of Alkali Chemicals Corporation of India Ltd. @ 15 mg/kg B. Wt.). Albendazole (Albomar-Clindia Ltd., Bombay) @ 5 mg/kg B. Wt., orally have successfully been used for the elimination of gastrointestinal parasites supplemented with mineral mixture of standard firm @ 100 gm daily for 20 days. The owners are also advised to get the dose of anthelmintic repeated after 20 days. They are further advised for the continuous feeding of mineral mixture @ 50 gm daily for 4-6 months with good nutritive diet, as a preventive measure. The owners are also advised to feed common salt to their animals along with the feed regularly.

The farmers are also advised to write or visit the Department of Veterinary Medicine, College of Veterinary Sciences, Haryana Agricultural University, Hisar-125 004 for their problems on pica or other camel diseases from time to time.

## **Equine Rhinopneumonitis/Viral Abortion**

**Cause :** It is caused by a virus-Herpesvirus of equine Type-1.

**Symptoms :** There are three forms of the disease.

- (i) Respiratory form
1. Fever (106°F)
  2. Initially in young horses acute respiratory disease characterized by rhinopharyngitis and tracheobronchitis.

	<ol style="list-style-type: none"> <li>3. Nasal discharge.</li> <li>4. Anorexia, depression, coughing.</li> <li>5. Clinical signs may last from 2 to 7 days.</li> <li>6. Death rate is low.</li> </ol>
(ii) Neurological form	<ol style="list-style-type: none"> <li>1. Incoordination in walking.</li> <li>2. Difficulty in urination.</li> <li>3. Animal may struggle or may lie quietly.</li> </ol>
(iii) Abortion	<ol style="list-style-type: none"> <li>1. Abortion in last phase</li> <li>2. Thoracic cavity may contain fluid.</li> </ol>
Diagnosis	<ol style="list-style-type: none"> <li>1. By characteristic symptoms.</li> <li>2. By laboratory confirmation.</li> </ol>
Treatment	There is no specific treatment, however, a symptomatic treatment may be given.
Control	<ol style="list-style-type: none"> <li>1. Isolation of affected animals from healthy animals.</li> <li>2. Rest should be given to affected animals.</li> </ol>
Prophylaxis	A killed virus vaccine, PNEUMABORT-K can be imported from Fort Dodge Laboratories, Fort Dodge Iowa, 50501, USA. The vaccine is given on 5th, 7th and 9th month of pregnancy @ 2 ml intramuscularly. The guidance of nearest Veterinary Hospital may be taken.

### Any other information

The Department of Veterinary Microbiology, Haryana Agricultural University, Hisar-125 004, provides the diagnostic services for the disease. For this, tissue pieces of liver, lung, heart, kidney spleen and brain (if there is involvement of nervous symptoms) from the aborted foetus may be collected in 50% glycerine buffer saline and *despatched on ice* under the sterile conditions *as quickly as possible*.



## VACCINATION SCHEDULE FOR DOGS

Disease	Age (Primary)	Booster (Age)	Dose and route
Canine distemper	4-8 weeks	12-16 weeks	2 ml S/C
Infectious canine hepatitis	4-8 weeks	12-16 weeks	2 ml S/C
Rabies	12 weeks	One year	5 ml S/C
Parvovirus infection (Serum Institute of India)	6-8 weeks	12 weeks	1 ml S/C

### Vaccine Available

1. **Penta Dog** : Serum Institute of India, Pune-411 028. It is used against rabies, distemper, hepatitis and leptospirosis. Two ml of vaccine is given at 6-8 weeks of age, second injection 4 weeks after the first injection and booster one year after 2nd injection.
2. **Canine distemper and canine hepatitis vaccine** : Live freeze dried vaccine from Biomed, Ghaziabad. 2 ml of vaccine is given S/C and provides immunity for one year.
3. **Candur DHL vaccine (Hoechst)** : Provides immunity against canine distemper and hepatitis for 1-2 years.
4. **Caniffa** (France) : Veterinary Institute Merieux-France. Provides immunity against distemper, hepatitis and leptospirosis. One ml S/C at 7-10 weeks of age and booster after one year of 1st injection.
5. Canilep (DHL) from Glaxo and Nobivac DHL from Intervet Pharmaceuticals are also available and can be given accordingly.

**Rabies vaccines** : 1. **Rabisin (cell culture vaccines)** from Serum Institute of India, Pune. 1 ml S/C at 4 weeks of age, then at 8 weeks and then after 3 years.



2. **Durarab 1 and Durarab 3 (Tech. America) :** Marketed by Vestas, New Delhi. Inject 1 ml I/M at 4-6 months of age, repeat after 6 months. Repeat annually with durarab 1 and every 3 years with durarab-3.

3. **Raksharab (Indian Immunologicals).**

4. **Candur R (Hoechst).**

5. **Nobivac-R (Intervet).**

These vaccines are available and can be used for prophylactic vaccination against rabies.





